ELECTRICAL REVIEW

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Power Companies' Position

Maximum or Minimum Tenure?

DURING the past month the chairmen of some of the leading power companies have referred to the proposals which have been made for settling the future of the electricity supply industry. They have naturally stated the case for the continuance of "private enterprise," a somewhat misleading description of a public service of which they have no reason to be ashamed, and have commended the memorandum on the subject produced by the Incorporated Association of Electric Power Companies.

McGowan Report

As they have pointed out, this memorandum follows (with one important exception) the lines laid down in the report of the McGowan Committee on Electricity Distribution which was published about eight years ago. It may be worth while recalling some of the salient proposals contained in that report.

After studying the evidence given by all sections of the industry and other interested parties, the Committee came to the conclusion that, broadly, any scheme for the improvement of distribution must involve either the immediate and complete reorganisation on a regional basis under public control, by the setting up of regional boards to acquire all the existing undertakings, or the retention of the larger and more efficient undertakings (both public authority and company) which would absorb the smaller and less efficient. The first of these alternatives was rejected as being likely to cause serious and unnecessary dislocation of an industry which had generally proved progressive and enterprising.

Accordingly the Committee fell back on the second alternative and for this purpose suggested that temporary district commissioners should be appointed to prepare schemes for suitable districts which would be reviewed and approved by the Electricity Commissioners. It was anticipated that in most cases the power companies would be retained and that associated distribution companies would be amalgamated with them. These consolidated undertakings would be purchasable by some form of public authority at the end of a prescribed period, not exceeding fifty years, on the basis of capital expenditure less depreciation. Measures of control of finance and charges were proposed.

White Paper Proposals

The Government's White Paper issued in 1937 proposed to hand over the preparation of schemes to the Electricity Commissioners without the intervention of the suggested district commissioners. It visualised schemes based primarily upon the retention of the larger and more efficient existing undertakings, but where this proved impracticable it provided for the setting up of distribution authorities or joint boards. The tenure of retained companies was limited to fifty years, with provision for their acquisition by a public body at ten-year intervals within that period.

The power companies, however, con-

sidered that the prescribed period for the purchase by a public body of their undertakings should be not less than fifty years and that even then purchase should be optional. This is the important exception to which we have referred and it obviously puts off for a very long time one of the main issues. This postponement is justified by the suggestion that it is doubtful "whether those living to-day would be wise to postulate any particular form of ownership of the undertakings half a century hence." In any event, it is said, any period of tenure fixed now could be varied at any time by Parliament if circumstances so required.

University Research

As befits the position of Manchester as a centre of electrical engineering, especial attention is paid to this subject in the report of a Committee (of which Dr. A. P. M. Fleming and Prof. Willis Jackson are members) appointed by the University to consider future expenditure. The abiding link between the University and industry, the Committee points out, lies in its research facilities, and reduction in the time-lag between the publication of results of academic research and their industrial application calling for a constant flow of men from the one to the other. Equipment for the electrical laboratories would cost about £20,000 at pre-war prices, and the annual outgoings should be increased by well over 200 per cent. For other universities, less well endowed at present, the needs would presumably be proportionately greater.

Rural Supply

SOME of the views expressed by Mr. P. E. Rycroft in opening the discussion of the report of I.E.E. Sub-Committee No. 3 were distinctly against generally-accepted ideas. He contended that there were not a large number of consumers in rural areas "clamouring for supply" as the report seemed to suggest; for a very large proportion of them electricity could be had for the asking. He refused to accept overhead lines as an essential and permanent feature of rural supply, urging that on a long-term view underground distribution offered real advantages in many cases. The value of mechanised farms to the load builder was regarded by him as largely illusory; it was to the farmer's wife that the supply authority should look. Mr. Rycroft accused the Sub-Committee of timidity in the matter of rural supplies which, he maintained, did not depend upon subsidies for their success.

Fault Data

IN an article in the *Electrical Review* of July 30th, 1943, a reasoned plea was made by Mr. J. A. Sumner for the pooling or interchange, on a common record basis, of information regarding breakdowns as between different supply undertakings. For this purpose some co-ordinating body would be necessary and on the various grounds then stated the Electrical Research Association would appear to be the most appropriate organisation. Action has been taken on these lines, we understand, on the initiative of the I.M.E.A., and it is to be hoped that the E.R.A. will be able to complete its arrangements for collating such experience in the near future.

Electric Cooking Preferred

THERE have long been signs that the gas industry has had qualms about the cooking load which it once regarded as reasonably safe. In the last two or three years there has been much talk of "co-ordination" of fuels which electrical people, with some justification, have considered to be a means of securing to gas certain definite applications. Whereas the use of electricity for cooking used to be regarded with a certain amused detachment it has become obvious to the gas industry that public preference has shown a pronounced electrical trend. That this trend is apparent in Scotland is shown by the report of the Scottish Housing Advisory Committee but the price of electricity has militated against the adoption of electric cooking. It is indicated in the report, however, that the operations of the North of Scotland Hydro-Electric Board are hoped to remedy this.

Duplicated Services

IN a letter in our issue of February 18th last, Mr. F. W. Purse asked why money should be wasted in providing for both gas and electricity in new houses and suggested that as electricity was indispensable for certain purposes there was no reason for installing gas services at all. The Scottish Housing Advisory Council seems

to go most of the way with Mr. Purse when it says that as the only object of providing gas supply in domestic dwellings is to enable it to be used for cooking and heating purposes the provision of both gas and electricity services would lead to a great deal of superfluous and unnecessary expenditure. Electricity, it says, is universally to be preferred for lighting purposes " and we imagine that all houses in areas where electricity is available for lighting purposes at reasonable cost would be wired for heating and cooking also." Houses would only be piped for gas if gas was likely to be much more economical for cooking and heating purposes.

Windmill Generators

WIND as well as water in the Scottish Highlands may be harnessed for power production. This interesting announcement was made by Mr. A. E. McColl, deputy chairman of the North of Scotland Hydro-Electric Board, at a recent Press conference. He said that they were investigating the possibilities of small wind-power plants like the Secretary of State for Scotland had at his home at Fintry. A few of these had been purchased for experimental purposes and in a year's time they would know what type of windmill was best for the particular conditions on the West Coast and in the Highlands. A number of small units of the kind mentioned by Mr. McColl are already operating satisfactorily in this country although larger plants, such as the 1,000-kW installation in Central Vermont, U.S.A., are still in the experimental stage.

Exports to Dominions

IN all discussions of our future export trade mention is made of the possible adverse effects of the increasing industrialisation of the Dominions. It is undoubtedly the case that Australia, for example, has considerably increased her home production of electrical equipment in the last twenty years and thus has apparently deprived our electrical manufacturers of trade which they might have legitimately hoped for. Nevertheless they have managed to retain some hold on the market and that market has continued to grow so that maybe the position is not so hopeless after all. This is a view held by Sir Alexander Roger. In a statement issued with the 1943 report of British Insulated Cables, Ltd., he says that the problem of the industrialisation of the Dominions certainly exists but it need not necessarily mean a falling-off in British trade. He holds that the exchange of goods between industrial nations has increased just as much as exchange between industrial nations and raw material producers.

Industrial Fuel Economy

THE announcement by the Ministry of Fuel and Power last week that industrial consumption of gas and electricity was to be cut by 25 per cent. and 10 per cent. respectively has caused some bewilderment and consternation among manufacturers. The need for economy is not questioned and most industrial concerns have done all that they could to reduce their fuel consumption. But there is a point below which many establishments cannot go without seriously interfering with vitally necessary production. It is not clear how the cut will be secured. Enforcement will not be easy and it seems that reliance will have to be placed on the industry itself, which means that the figures are merely a " target " which it will be the duty of the firms to reach if they possibly can.

Wiring Systems

IN his recent I.E.E. paper on the design of electrical installations as influenced by maintenance requirements, Mr. Hamlyn Drake, a past president of the E.C.A., expressed a preference for screwed conduit over the grip joint type. Mr. Forbes Jackson (L.C.C.), who opened the discussion on the paper, on the other hand, considered that, properly handled, grip joint conduit was quite satisfactory and a good deal cheaper. The matter has been discussed in E.C.A. circles for many years past, and the preferences of contractors have usually been decided by reference to cost or efficiency; it has seemed that low price and first-class material could not go together. Recently the North-West Counties Regional Board of the E.C.A. decided by a large majority that v.i.r. in screwed steel conduit was the best form of wiring and it was suggested that " lug-grip conduit should be removed altogether." The Surrey Area Branch of the Association has also voted in favour of v.i.r. in screwed tubing; its second choice is lead-covered cable and lug-grip conduit is placed third, with copper-sheathed magnesium oxide cable fourth.

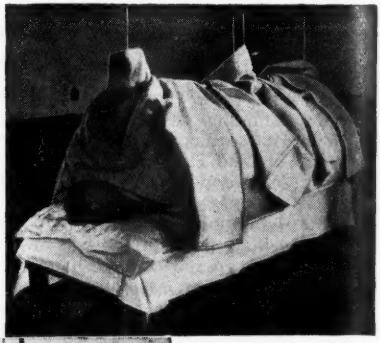
Keeping Miners Fit

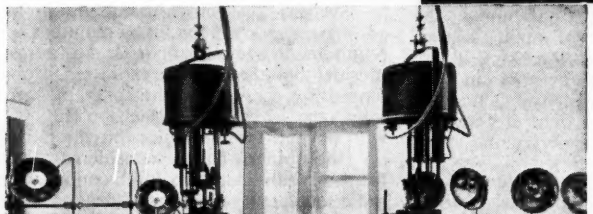
Success of Electrical Clinic at a Colliery

THE war has done much to emphasise the importance of health welfare work and the provision of adequate facilities for medical treatment in industrial establishments. By speedy and efficient attention to the prevention and cure of injuries and illnesses, not only do the employees themselves benefit but production is increased and improved by the reduction in the man-hours lost and by maintaining health at the highest possible level.

This is true of all branches of industry but, owing to the nature of their work, miners in particular are in need of supervision with regard to their health. Injuries to limbs are not uncommon underground, whilst working conditions are conducive to rheumatism. There is also a tendency towards a general lowering of health due to lack of sunlight. Realising these facts the Butterley Co., Ltd., has set an example to the mining industry by the establishment at its largest colliery, at Kirkby, of a clinic which must be unsurpassed for the comprehensive collection of electrical treatment apparatus provided. Dr. Ladislas Schmidt, the company's consulting physician, who is a specialist in rheumatic diseases, was given more or less *carte blanche* in the equipment of the clinic. Unfortunately, wartime restrictions prevented the erection of a new building to house the equipment, but it was possible to convert for the purpose a disused pay-office conveniently situated adjoining the up-to-date pithead baths. As a result, men requiring treatment can now leave the "clean" end of the baths and proceed *via* a corridor comfortably warmed by means of thermostatically controlled tubular heaters, straight into the clinic.

The majority of the patients (the term "patients" is perhaps rather a misleading one, since almost all of them are in the very best of health) attend solely for regular artificial sunlight treatment. Actually no less than three-quarters of the 1,800 men employed in the mine take advantage of the facilities and it is true to say that, although the treatment takes only a few minutes, many more of the remainder would attend also but for the fact that they live some distance from the mine and have long journeys.

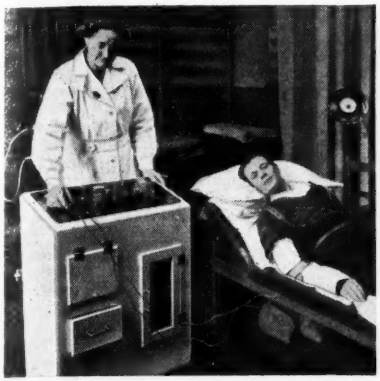




Above: One of the infra-red heat cradles for the treatment of lumbago, neuritis, etc. Left: Three hundred miners can be treated in an hour in the solarium

To provide the artificial sunlight treatment, the "solarium," a room measuring 15 ft. square, has been arranged to treat twenty-four patients at a time. The equipment consists of two "Sunrae" carbon-arc ultra-violet lamps in the centre of the room, with twenty-four "Perihel" mercury-vapour u.v. lamps and twelve 600-W "Perihel" infra-red lamps in

six banks of four and two respectively round the walls, roughly forming a hexagon. In one half of the room the banks of u.v. and i.r. lamps have been arranged so that the



Electro-medical switch table for galvanic, faradic and ionisation treatments

former are above the latter and in the other half *vice versa*.

This combination of "soft" long rays of the carbon lamps with the "hard" short rays of the mercury-vapour lamps and the very long rays of the infra-red lamps, Dr. Schmidt claims, besides reproducing as exactly as possible the genuine solar spectrum, minimises the risk attendant on indiscriminate u.v. irradiation of awakening latent tuberculosis, and also accelerates and improves the action of the u.v. rays owing to the simultaneous stimulus on the skin by the infra-red rays.

As twenty-four patients can be accommodated at one time, 300 men can be passed through the solarium in an hour, allowing a treatment period of three minutes and a changing interval of rather less than two minutes. Both the solarium and the changing room, in fact the whole of the treatment rooms, are warmed by tubular heaters thermostatically controlled. Particular care has been taken to earth all apparatus.

Besides the solarium there is a combined general treatment room and gymnasium, which is also comprehensively equipped with electrical apparatus. Several individual u.v. and infra-red units are provided for special cases, including localised complaints such as alopecia, while there are two infra-red heat cradles suitable for treating either the whole or only the top or lower parts of the body for such complaints as lumbago and neuritis. Electromedical switch tables enable galvanic, faradic and ionisation treatments to be given, including 4-cell Schnee baths in which the patient sits with his arms and legs immersed in water which is in contact with the electrodes.

For after-effects of injuries, stiffening of joints and very bad cases of rheumatism, two diathermy equipments are available, one a spark-gap apparatus and the other an ultra-short-wave apparatus, incorporating a triode valve and glass electrodes. To prevent interference with short-wave radio transmission the whole of this apparatus is specially screened by being enclosed in a wire cage. Vibratory massage is given by means of Stanley Cox apparatus, and the various gymnasium appliances include Mennell's spinal apparatus intended primarily to correct deformities of the spine, etc., arising from the disproportionate use of muscles as a result of continual stooping. Smith's electric clocks are used to time treatments.

Further facilities for the treatment of rheumatism are provided by dry-heat or "Turkish" baths. Here patients, after entering through an ante-chamber of moderate temperature, go first to an outer room heated to between 150–180 deg. F. and then to an inner room where the temperature is further raised to 180–200 deg. F. The walls of the heated chambers consist of asbestos sheeting on 4 inches of cork, and to produce the necessary rise in temperature five rows of thermostatically controlled tubular heaters are utilised.

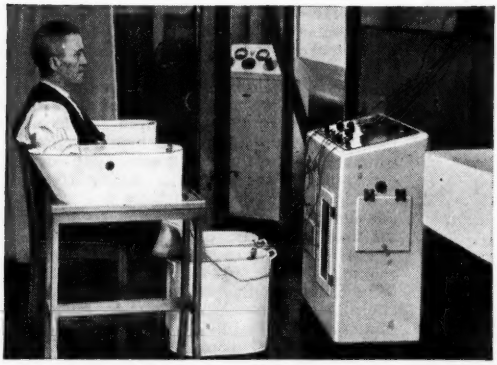
For patients suffering from rheumatoid arthritis a wet treatment room has been equipped to apply the Pistany mud-pack

Diathermy is used to treat after-effects of injuries, stiff joints and very bad cases of rheumatism

treatment, which has been successfully employed in Czechoslovakia for over 300 years. The medicated mud is heated in individual containers housed in an insulated box, which is electrically heated and thermostatically controlled. The mud is applied directly to the arthritis joint at a temperature between 115 and 130 deg. F., the comparatively high

temperature being possible because of the extremely low thermal conductivity of the mud.

In the first-aid room, from which incidentally the solarium equipment is controlled, cases of shock are dealt with by the use of



A patient receiving a Schnee bath

a radiant-heat bath embodying carbon-filament lamps. Ample supplies of hot water are provided by a 15-gal. "Creda" electric water heater. The doctor's consulting room is equipped with a steriliser and a three-pint electric kettle. With the exception of the solarium equipment which was provided by Perihel, Ltd., and Watson & Sons (Electro-Medical), Ltd., the whole of the electrical apparatus was supplied by Stanley Cox, Ltd.

The clinic has now been in operation long enough to get some idea of the results achieved. Every month, in addition to an average of 2,500 treatments in the solarium (patients attend at least twice a week), about a thousand other treatments of all kinds, including those to men sent from the company's other collieries, are given. When the clinic was first opened as many as 1,200 treatments (excluding solarium) were given monthly owing to the accumulation of old injuries needing attention. There are no charges of any kind and every endeavour is made to avoid "waiting about." Besides being open every afternoon from 1 to 5 p.m., the clinic caters specially for night shift workers on Mondays, Wednesdays and Fridays from 10–11.30 p.m. and on Tuesdays, Thursdays and Saturdays from 6–8 a.m. Dr. Schmidt, whom we thank for showing us round the clinic, is very satisfied with the general improvement in the miners' health that has followed the opening of the clinic and he is at present engaged on assessing the effect on coal production.

NEW BOOKS

Plastics: Scientific and Technological. By H. R. Fleck, M.Sc., F.I.C. (pp. 325), illus. Temple Press, Ltd., Bowling Green Lane, E.C.1. Price 25s.

In opening a book of this kind one automatically looks for the materials with which one is familiar. My own reaction was to turn to polythene and p.v.c., but I could not find a mention of polythene anywhere, although this is Britain's major contribution to plastics, one of the greatest contributions to the war effort, and the leading electrical material in use to-day. In this country we have hardly yet seen any "Saran" (polyvinylidene chloride) nor silicon resins, yet these receive consideration on several pages.

Turning to other aspects of materials of interest to the electrical industry, there are other deficiencies. Ethyl cellulose gets no consideration; polyvinyl formal the very sketchiest treatment. There is no practical information concerning the material which is being used to the extent of many thousands of tons, namely polyvinyl chloride. On the other hand, on p. 187, there is an interesting section on the electrical characteristics of phenolic resins.

Where Fleck sticks to advanced chemistry, I like his material. In particular I think there is much to be said for the details which he frequently gives on preparations and tests. In this respect he has performed a service by showing that plastics is very much a scientific subject. He introduces much of the latest fundamental and advanced research work.

In my view the book is completely unbalanced. Fundamental technological aspects such as extrusion, cast resins, etc., are dismissed with less than a half page each. Impregnated and compressed woods get barely more than a mention, although space is devoted to the cutting of the veneers—hardly a plastics subject. The testing of plastics is treated very superficially, while the chemical analysis section deals with only a few selected raw materials. What is required is much more data on the testing and analysis of the finish plastic products.

Thus, while Fleck's discussion of synthetic elastomers is interesting, yet I find them completely out of place. The space taken could have been usefully devoted to further consideration of generally accepted plastics, many aspects of which have been sadly skimped. There are also a number of detail matters which might be criticised.—H.B.

Shorter Notices

The Thermal Technics of Steam Boilers. By J. Webster (66 pp.). Price 1s. 6d. **White Metalling.** By H. Warburton (80 pp.). Price 2s. "Mechanical World" Monographs Nos. 16 and 17. Emmott & Co., Ltd., 78, Palatine Road, Manchester, 20.

Engineers of the Future—V

Apprentices and Students

English Electric Company's Training System

By F. Caunce,
M.A., B.Sc., Wh. Sch., A.M.I.Mech.E.

THE English Electric Company has always shouldered its responsibility to the engineering industry for the training of apprentices, a policy carried on from the individual firms which combined in 1919 to form the present company. Training schemes must, of course, be related to the needs of the organisation in which the young engineer subsequently makes his career. It will be appreciated, therefore, that in the schemes which are outlined later, the training is devised primarily to ensure that the young man, after training, can fit smoothly into one of the many careers open to him within the company. There are, of course, many opportunities outside the company, at home and abroad, for which the training is eminently suitable, and the company carries a proportion of apprentices whose ultimate aims lie in these other related activities.

Mr. Caunce is superintendent of the company's Technical Education Department

To a large extent the individual works of the company are associated with the products with which they built up their reputations as individual firms. These products cover a very wide range, both mechanical and electrical, and a young man joining the company is given a choice of interest and opportunity which we believe is unsurpassed anywhere in the country. To some extent this range of possible careers makes the apprentice's decision regarding his future a difficult one. It is the company's experience that even at the end of apprenticeship some apprentices have not finally decided on the type of work with which they wish to be associated.

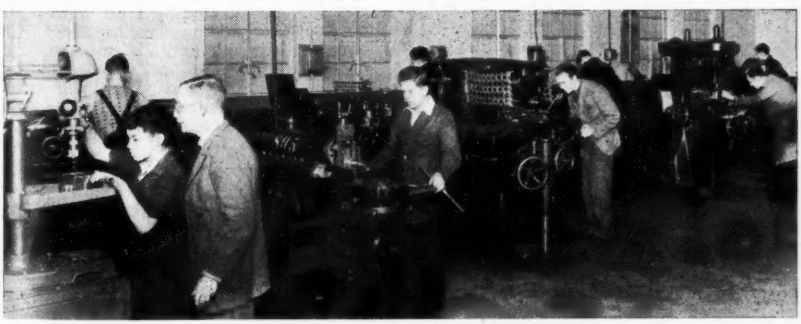
It is perhaps in this sphere that the apprentice supervisor can best help. Whilst apprenticeship is a training and learning period for the apprentice it is no less a period of study for the supervisor. If the young man, on completion of apprenticeship, is to find his proper niche, the supervisor must have given careful consideration to every aspect of the young man's personality and aptitudes, and thus be in a position to give helpful advice and counsel. The company recognises that it is of paramount importance that its personnel shall be engaged in the variety of work in which they are really interested and best qualified to perform.

Apprentice training is carried out at each of the company's works on similar lines although, in the brief details which follow, one scheme is used by way of illustration.

Grades of Apprenticeship

On admission to the apprenticeship scheme the candidate is placed in one of three grades —trade, engineering and student apprenticeship.

A *trade apprentice* is usually a boy from an elementary school who is indentured to a particular trade. He serves a five-year apprenticeship from 16 to 21 years of age and during this time receives wages at a rate



A section of the basic training workshop

agreed by the Employers' Federation and the trade unions for the particular area in which the works is situated.

The *engineering apprentice* is an ex-secondary or public school boy who, to be eligible for this grade, must be in possession of a good School Certificate, being particularly strong in mathematics and science subjects. This academic aptitude is insisted upon since the majority of these apprentices are attracted to work of a technical nature and the boy must give evidence of having the capacity to absorb technical knowledge. The term of apprenticeship is a net four years during which time wages are paid at the same rate as for the trade apprentice. To allow for the boy who stays at school to obtain the Higher School Certificate, the engineering apprentice may begin his training at any age up to 18 years. The essential difference between the engineering and trade apprentice is that the former is given a more general training than the latter, at the expense of specific craft skill. In normal times a young man may spend twelve months in the works as an engineering apprentice before proceeding to the university and resume as a student apprentice on graduating.

The third grade, that of *student apprentice*, caters for the university or technical college graduate who has obtained a good degree in engineering science but needs practical training to supplement his theoretical knowledge. The course lasts two years and wages are paid which enable the apprentice to support himself in a reasonable manner.

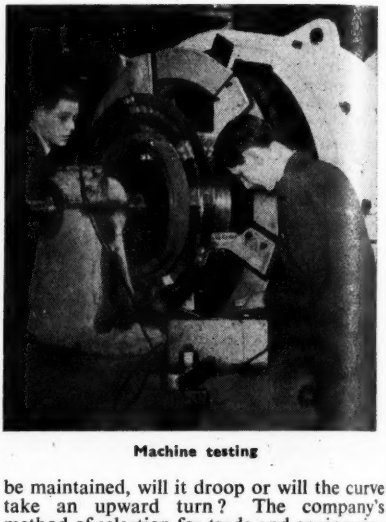
Upgrading

Every encouragement is given to the apprentice to qualify for "upgrading" to the next higher grade, with its consequent wider training and greater opportunities for higher posts. A trade apprentice is upgraded to engineering apprentice on obtaining the Ordinary National Certificate and the engineering apprentice is transferred to the student apprentice grade when he obtains his degree. It will be noticed that a trade apprentice may in this way rise to the higher grade of apprenticeship and opportunity.

Selection of Apprentices

In my opinion there is no aspect of apprentice activity of so great an importance and responsibility as that of the initial selection. Every engineer is familiar with the story of Michael Faraday, originally apprenticed to a bookbinder, fortuitously coming under the discerning eye of Sir Humphrey Davy who selected and trained Faraday for the great work he subsequently performed. How many Faradays must there be who are apprenticed to some profession in which no doubt they do tolerably well but in their proper sphere would rise to the highest eminence?

It is a responsible duty, and one involving experience, to sit in judgment on a boy and to decide whether or not he reaches the necessary standard for acceptance. There is the same feeling of doubt as when extrapolating from a graph. Will the performance



Machine testing

be maintained, will it droop or will the curve take an upward turn? The company's method of selection for trade and engineering apprenticeship is based on three aspects of the boy's make-up. Firstly, his school performance—academic and social; secondly, an assessment of personal qualities made at an interview and thirdly, certain intelligence and aptitude tests.

The interview is used mainly to assess the candidate's personal qualities — his manner, keenness, co-operation with others, initiative and powers of leadership. The questions put to the boys are framed with the object of finding these qualities. The school record and aptitude test results are studied carefully to see whether the boy has the type of mind which will readily absorb engineering knowledge and whether he is likely to develop the complementary practical skill. It is not claimed that this method is infallible, but the aptitude tests in particular serve as very useful guides in arriving at a decision. It is not politic to describe the tests in detail since their value would be lost if the candidate knew what to expect and could practise before the event. This much may be said, however, that there are five tests in all; one intelligence test, two theoretical aptitude tests and two tests of practical mechanical ability, one of which

is a dexterity test to determine the degree of co-ordination of mind and hand.

For the student apprentice, the graduate's placing in his degree examination is given its proper valuation and the selection made after a personal interview.

The same care and trouble are taken over each individual, whether he be from an elementary school or from a university. At each interview the guiding principle of the interviewer should be not from whence the boy has originated but what can he be trained to become.

Training

Whatever the ultimate career of the apprentice, he should have a sound general training in the processes of manufacture and in the sense of proportion of mechanical structures. Accordingly, trade and engineering apprentices spend their first year full-time in the Engineers' School which comprises a training workshop and lecture rooms. The workshop contains fitting benches and a machine tool section, and during his year in the school a basic training is given in bench and machine work. A certain amount of the work done is of the exercise type to bring out the salient points of the use of hand and machine processes, but in the main the instruction is given on suitable jobs selected from the production work of the main shops.

The apprentice also makes for himself a set of tools which he is encouraged to finish to the best of his ability as an incentive to the proper care of tools whether they are his own or the company's property. The micrometer and vernier are the accepted methods of measurement and the standard of workmanship aimed at is that of the tool-room. A legitimate use of the school workshop is the manufacture of special equipment for the research and other departments as this fulfils two main functions. Firstly, the apprentice deals with interesting, ingenious and useful mechanisms, and, secondly, the making of the equipment relieves the main workshops of items which interfere with normal production.

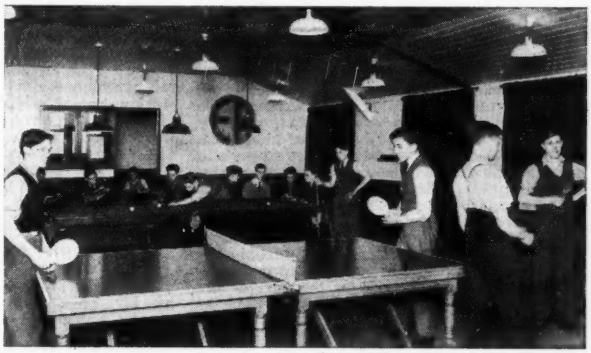
In addition to basic training the instruction under supervision enables a study to be made of the manual aptitudes of the trade apprentice in particular. The workshop thus functions as a selection centre as well as for training. On the theoretical side instruction is given in mathematics, workshop practice and the reading and interpretation of engineering drawings.

After the first year, apprentices are set on a planned course of further training and experience in the main shops. They continue to attend the school for further lectures and their shop progress is watched by a system of reports from the foremen of the departments in which the apprentices are serving. In addition to instruction given in the works, apprentices must attend the local technical college for courses leading to the National Certificate in the appropriate subject, or for the London external degree in engineering.

The student apprentice's training is mainly one of shop training, but attendance at the school is included for lectures on the company's activities given by departmental chiefs and other technical personnel. In addition, the student and senior engineering apprentices meet once per week as a discussion group when each in turn presents a paper on some topic, technical or otherwise, for comment and criticism by the others. It is hoped by this means to increase their confidence in speaking before an audience and to develop the faculty of intelligent and constructive criticism. Further, some of the student apprentices have collaborated with the teaching of the junior apprentices, an arrangement which benefits teacher and pupil considerably.

Welfare

The training of apprentices is not only a matter of technical knowledge. Modern industry has grown to such proportions that the success of an enterprise depends largely upon the way in which the employees work together as a team. Besides technical skill the apprentice must learn to be a citizen in the widest sense. He must appreciate his neighbour's point of view, and these lessons are perhaps the hardest to learn.



Adequate provision is made for relaxation

To encourage the service to others and a healthy social life the apprentices have their own Association, organised and controlled by themselves. The company has provided them with a club house equipped with the usual indoor sports and provision for quiet reading and discussion. There is no distinction between the grades of apprentices: all are entitled to the same privileges and opportunities. The value of the Association and its club life is particularly great under war conditions.

The Future

Few people will hazard a guess at the conditions of life after the war, but whatever they may be, the need for energetic, flexibly minded, fully trained men will be acute. If Britain is to retain her place in the world and her standard of living, the quality of her products must be of the highest. This quality can only be attained by due regard to research, design, production methods and craftsmanship, and our engineers of the future must be pre-eminent in all these varied fields.

It is not sufficient to train to existing levels; vocational training and education must occupy an increasing amount of attention and it is encouraging to see the national concern which these matters are now receiving. Most large firms are facing up to the problems and at their own expense attempting to play their part. Much needs to be done by the State in the field of education and in the new Education Bill it is apparent that careful thought is being given to this complex problem.

Industry and the educational authorities will have to find a stronger liaison, as it is upon the power derived from knowledge and skill that our standard of life depends.

Tasmanian Commission's Report

Demand Reaches New Peak

CONTINUATION of the heavy demand on the power system due to war loading is recorded in the annual report of the Hydro-Electric Commission of Tasmania for the year ended June 30th last, a copy of which we have received from the Commissioner, Mr. W. E. Maclean. The combined output of all stations reached a new peak level, but by careful control of the discharge of Lake St. Clair all demands on the system were met.

The report looks forward to a great improvement in the supply position with the coming into operation of the generating plant. Good progress was made during the year with the construction of hydraulic works and of power station buildings for the accommodation of the new plant. These works, which were for the immediate production of more power, were accorded priority ranking equally with munitions work, and the report states that the same priority was granted in England for the manufacture and export of the principal machinery, much of which had already been delivered, though certain important items were still to come. Some of the new main and auxiliary plant had been erected at the date of the report.

On the other hand, it is stated that progress in the development of other hydro-electric works, particularly the dam at Butler's Gorge, was seriously delayed during the year, mainly by the gradual reduction of the labour force, the failure to recognise the essential need for granting these works a higher priority, and possibly the absence of technical knowledge and appreciation of the value of the works on the part of the committee charged with the allocation of labour throughout the State.

The year's production figures show an increase of 5½ per cent., with a total of 690 million kWh generated (335 million at Tarraleah, 300 million at Waddamana and 63 million at the Shannon station). Altogether about 765 million kWh was generated by water power in the State, representing the high average of 3,190 kWh per head of the population. In spite of wartime difficulties 843 new consumers were connected, making the total 41,944. The Commission's Retail Supply Branch sold 109 million kWh (approximately 2,600 kWh per consumer) during the year. This was an advance of 14 million kWh on the previous year and more than half of the increase was in sales to residential consumers.

The only remaining local authority undertaking in the State—at Launceston—is to be brought under the management of the Commission in the near future, the terms of transfer to be determined by arbitration. When the transfer has been completed the Commission will control the retail supply of electricity throughout the State, with the exception of three municipalities which are supplied from private plants erected primarily for mining purposes.

In May last year reductions in charges were made which benefited consumers by approximately £12,000 per annum.

The Commission's accounts show that revenue increased by £55,659 to £778,142 while working expenses at £225,672 were up by only £595. After meeting interest and other charges, the amount available is £61,136, of which £24,000 is allocated to general reserves and £33,000 to special redemption reserve, the net profit of £4,136 being paid to the Treasury.

Morecambe Bay Development

REPRESENTATIVES of Barrow, Lancaster and Morecambe and Heysham Corporations have met to discuss the scheme propounded by Mr. Ellis Smith, M.P. for Stoke-on-Trent, for the development of Morecambe Bay by the construction of a causeway across the Bay, a seaplane base and a hydro-electric plant. They decided that in view of the reply from Sir William Jowitt, in which he intimated that there was no prospect of making further progress with this scheme in the immediate post-war years, they will recommend their Councils to instruct their surveyors to prepare alternative schemes.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

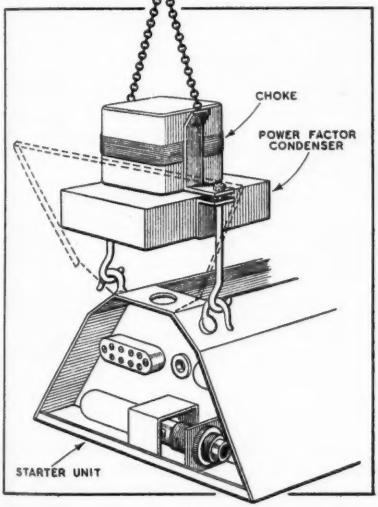
Fluorescent Lamp Fitting

PROVISIONAL patent protection has been granted to CROMPTON PARKINSON, LTD., Electra House, Victoria Embankment, London, W.C.2, for a trough fitting, to accommodate a 5-ft. fluorescent tubular lamp of 80 W, which is provided with a top slot along the whole length of the inverted trough reflector to allow a small amount of light to be diffused upwards, thus helping to relieve the " tunnel " effect.

This fitting (C.P.454) is intended for either conduit or chain suspension and a wide variation of fixing centres is possible to suit roof constructions and to avoid obstructions, such as shafting. Inclusion of the starter in the reflector-end simplifies wiring, particularly when control gear is mounted adjacent to the fitting. Alternative suspension of the choke and power factor condenser in the chain is available. Conductors enter an easily accessible chamber, connections being made to two terminals of a block; all other wiring is completed before delivery.

The starter switch, housed in the wiring compartment, is easily accessible, and its action may be viewed through a slot in the base. As it is of the glow type, most end-of-life failures can be attributed either to lamp or switch without dismantling any part of the equipment.

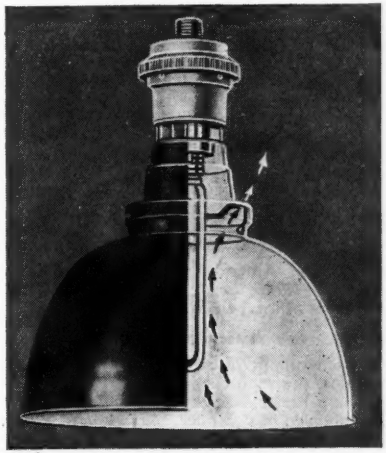
Fluorescent lamp fitting for industrial and commercial interiors



The open slot along the top is formed by shaping and turning the upper edges of the reflector, providing ample wiring channels which may be usefully employed when continuous trough arrangements are required, thus saving considerably on such items as conduit and wiring. It has a hard enamel surface and one lampholder slides to allow for necessary adjustments of length, tolerance, and bayonet action, whereas the other holder is fixed. Both holders are skirted to comply with the Home Office and Factory Act requirements.

Ventilated Reflector

An unusual feature of the latest " Stayclean " lamp reflector to be announced by VERITYS, LTD., Aston, Birmingham, is the means adopted to lessen the troublesome deposition of dust upon the interior surface. Instead of allowing fumes to remain in contact with the white vitreous enamelled surface, they are induced by convection currents of heated air to escape through specially formed ventilation slots in the neck of the reflector. Evidence that the object is achieved is afforded by two reflectors that have been in use side by side in a non-ferrous foundry for one month. The loss of light reflected from the ordinary model by comparison with a newer one exceeded 30 per cent. Glass diffusers are not needed while the " Overlamp " reflector and " Verikool " top are inclusive parts of the new fitting.



Convection expulsion reflector

" Instant-Starting " Fluorescent Lamps

The American Westinghouse, Lamp Division at Bloomfield, N. J., has announced plans to manufacture an " instant-starting " 40-W fluorescent lamp having the same rated life as the standard type needing conventional ballasts and starters. The new lamp will operate on a special type of instant-starting ballast. Limited quantities will be available after May 1st.

Power System Ownership

United States Survey

A STUDY of private *versus* public electric power in the United States is just being completed by the Twentieth Century Fund under the title of the "Power Industry and the Public Interest." The Twentieth Century Fund is a research organisation for study of economic problems founded in 1919 and endowed by the late Edward A. Filene, the Boston department store owner.

Among facts brought out by the survey is that 84 per cent. of the people of the United States now live in electrically lighted homes and that "there is no conclusive evidence that private enterprise is more or less efficient than public enterprise."

In view of the discussions and negotiations now proceeding in this country, this study of public and private power supply, rural electrification and large hydro-electric development in the United States is topical

The capacity of electric generators for public sales increased about 35 times and electricity output about 58 times, while the revenues of the industry advanced about 29 times between 1902 and 1940. As a whole the industry was found to have a greater net capital than any other industry in the country, except the railroads. Since the American defence programme began in 1940 there have been substantial increases in total electric power capacity.

"A Healthy Check"

Discussing private and public ownership of utilities, the report suggests that "each may act as a healthy check upon, but should not be allowed to hinder, the other." The report continues with the comment that "the profit motive may result in low costs if full advantage is taken of the possibilities of increasing consumption by low rates. On the other hand, private companies when handicapped by heavy financial burdens have been reluctant to take the risk of lowering rates because of the high ratio of their overhead to total costs. The shortcomings in the accounting practices of both municipal and private utilities have constantly hampered investigators who attempt to appraise their relative operating costs. But the information available indicates that, except in small communities, the rates of municipal systems compare favourably with those of private systems. Their costs also compare favourably despite the smaller scale of municipal production."

On the supply of electricity in rural areas, the Fund says: "Rural co-operatives are only beginning to emerge from their development stage and it is not yet clear whether they can cover their costs. If they can, they offer a cheaper form of electric service than private systems can afford to give. Few statistics are available to show whether rural co-operatives can maintain their present rates without subsidy. Since the programme is still in the stage of building up the load, current statistics do not indicate whether revenues will ultimately cover costs. A comparison of August, 1938, with 1939 records for 650 systems financed by the Rural Electrification Administration shows, however, that net revenues increased about 80 per cent. and operating costs by only 21 per cent. This suggests that steady progress has been made.

On such large projects as the Tennessee Valley Authority and Boulder Dam (both governmental) it is stressed that "the multiple-purpose projects of the Federal Government fall into a different category. Irrigation, navigation, flood control and other services, unsuited or unattractive to private enterprise, are combined in Federal projects. Many such projects are undeniably economical. The advantages of adding power facilities to projects for navigation and flood control often greatly exceed the cost. . . . Nevertheless, there are, as in all public projects, difficulties in calculating costs and dangers in rate comparisons which fail to take account of advantages enjoyed by public projects but inaccessible to private enterprise."

Need for Co-ordination

The report does not consider that public operation of electric systems necessarily means the exclusion of private utilities. "The latter," it says, "have made great technical contributions to the industry. Their organisation in some respects is more flexible than that of public systems. But the downward pressure of the private profit motive on costs has undoubtedly been over-rated, just as the capacity of public servants for initiative and enterprise has often been underrated."

In conclusion, the report says: "If our national power system is to remain partly public and partly private, the two segments must be co-ordinated. Much more effective arrangements for interchanging power between public and private agencies must be developed if the best use is to be made of the resources of large areas. This is part of the larger problem of regional co-ordination which may well eventually call for some form of public integration for the whole country."

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Domestic Load

IN his article on this subject (published in your March 31st issue) Mr. F. J. Elliott, besides giving interesting data, suggested that systematic research should be instituted into the characteristics of this important field of electricity supply. It seems that the article was written before the latest annual report of the E.R.A. was issued, from which I may be allowed to quote as follows:—

> "Special attention has been given to research into the characteristics of the domestic load. Existing load curves and pertinent statistical data are being collected and analysed. Replies received to a questionnaire on uniformly equipped housing estates and blocks of flats enable preparation to be made for organised tests after the end of the war, when load conditions have become normal again."

The work is in the hands of the Electricity Supply Technology Section of the E.R.A., governed by a committee on which many well-known members of the electricity supply industry are sitting. Among the subjects covered by this section, is cost research, and this matter is controlled by a special sub-committee.

*London, W.C.*2. P. SCHILLER.

Electricity Supply Reorganisation

I HAVE read with interest Mr. DeRenzi's reply to my letter in your issue of March 31st, but fail to see how he has justified the statements made in his previous letter.

I would like to correct Mr. DeRenzi's statement concerning voting power. Surely the most equitable basis would be on the number of consumers served.

So far as the Joint Memorandum is concerned, all I have to say is that the writing is on the wall for the smaller undertakings, and I would suggest that they stand by the selected station owners, otherwise but little sympathy will be forthcoming when the McGowan Report is revived—which to me appears to be inevitable. T. H. CARR.

Bradford.

Insulation Tracking

REFERRING to the article on this subject in the *Electrical Review* of March 31st, it would appear that the authors, Messrs. McNeill and Rubinstein, have made a rather cursory examination of the subject. Although little has been published on tracking of insulation, much work has been carried out by manufacturers and research organisations, and several specifications are available for the saline deposit test. Investigations have also been made employing controlled humidity chambers to give conditions approximating very closely to the practical case.

The distinctive properties defined by the terms "anti-tracking" and "arc resisting," respectively, are not to be confused, especially in application to circuit-breaker problems. The terms refer to the degree of carbonisation resulting from the combustion of an insulating material as the result of electrical arcing or heat which is generated by conduction currents.

In defining the property of "anti-tracking," the medium of a conducting deposit is required on the insulation surface. An electric potential applied to this conducting deposit may cause combustion of the material, depending upon, amongst other factors, the porosity of the material, surface roughness, etc. In the case of "arc-resistance," however, a flame or electric arc is definitely applied to the surface of the material, and although combustion may occur, the relative "arc-resisting" properties are defined as a function of the electrical properties of the deposited products of combustion, amount of erosion, etc.

Certain materials which have been considered to be appreciably "arc-resisting," such as grey and horn fibre (used extensively for arc-chutes and arc-control enclosures) are definitely poor in "anti-tracking" properties, compared with, say, phenolic bonded and moulded materials possessing a moisture-proof gloss surface finish. This fact is easily demonstrated by means of the 250-V saline solution test, when it will be found that the porosity of the grey and horn fibre results in sub-surface conduction currents which quickly produce an incandescent carbonised "track."

In the case of a highly finished phenolic material, however, the saline solution may be quickly evaporated and such surface sparking as occurs between residual moist patches on the surface may cause little carbonisation until the test has been repeated several times. A high gloss, *i.e.*, microscopically flat surface on the insulation sample, reduces the tendency to carbonise since direct contact of the arc with the surface is less probable than in the case of a "peaky" (*i.e.*, dull or rough) finish. Once carbonisation has been completed, however, the "track" has a much higher conductivity than in the case of the grey and horn fibre. The "arc-resisting" properties of the latter consist of:—(*a*) The high electrical resistivity of the combustion

products; and (*b*) its comparatively slow rate of combustion.

It will be appreciated, therefore, that mere visual observation of the formation of a "track" is of little value, and an important part of the test procedure is the measurement of the insulation resistance between test electrodes. If it is merely required to prove whether or not tracking can occur, and the degree of carbonisation is otherwise unimportant, then such information is easily supplied by a chemical knowledge of the material (for example, resin-bonded fibrous material *versus* porcelain, p.v.c. *versus* polythene, etc.).

In carrying out a saline solution test, a test which appears to indicate the behaviour of an insulator which is normally working at constant applied voltage, and where the surface may be subjected to contamination by conducting particles or liquids, the following points should be noted:—1. The shape and *material* of the electrodes should be standardised. 2. The degree of concentration of the saline solution (and preferably the quantity applied) should be specified. The quantity of solution may be easily regulated by applying a given number of drops, or making the test-piece in the form of a shallow dish to contain a constant initial depth of liquid. 3. The insulation resistance between electrodes should be measured after each complete evaporation. 4. The percentage moisture absorption (say, 24 hours, or 7 days in the case of low-hygroscopic surfaces) should be determined. 5. The applied voltage during test should be constant. 6. The application of an initial greasy coating such as soaping, as recommended by the authors, is liable to annul the porosity effect of the material.

The h.v. sparkover test which appears to be most suitable for examining the arc resisting properties of an insulating material should be carried out under the following conditions:—(*a*) The material and shape and bulk of the electrode should be standardised, as should the position and direction of the terminal connections, since the latter may considerably affect the positioning of the arc. The physical positioning of the test-piece is, of course, vital, *i.e.*, plane of test horizontal or vertical. (*b*) The arc-current should be maintained constant over a given period of time (dynatron control to give specified "cycles" is suitable for this purpose). The current value may be regulated by primary or secondary resistance in the h.v. transformer circuit. The authors do not state whether an arc or spark discharge was used in their tests. The presence of a heavy arc discharge may lead to metallic deposits from the electrode material. (*c*) The insulation resistance between electrodes should be measured after each "cycle" of arcing. (*d*) The amount of erosion should be measured. Comparative tests may be made by connecting two or more test pieces in series with the h.v. supply.

In following these precautions and observations, the test results may be made with reasonable accuracy for comparison purposes, and a rigid control of conditions, once attained, will simplify the testing procedure. However approximate and crude the method of testing, the use of a resistance measuring equipment is vital. Such equipments are commercially available, calibrated up to 10,000 megohms, 2,500V, DC.

Manchester, 11. R. N. BUTTREY, M.Sc.Tech., A.M.I.E.E., H.V. Laboratories, Cooke & Ferguson, Ltd.

Hot-water Tank Plumbing

IN the article under the title "Domestic Apparatus," page 421 of the issue of March 24th, it is stated "Another not well enough known device for reducing consumption is the inclusion of a 'kink' in the expansion pipe to seal the hot water." I consider this to be a very dangerous practice, and probably that is the reason why it is not well known and not adopted by the plumbing industry.

I appreciate that by putting a "trap" in the expansion pipe the losses are reduced, but there is a danger of the tank collapsing under certain conditions. I have seen cases of cylinders collapsing during a period of frost. These were not tanks heated by electricity, but by coal fires. On examination, it was found that the expansion pipe, instead of rising vertically from the tank, ran horizontally for a few feet with a dip, before it rose. The trouble was that the cold feed to the tank had been frozen, steam created in the tank and the water evaporated, and when this was discovered and the fire drawn, the tank cooled down and drew the condensed water from the dip in the expansion pipe into the empty tank, with the result that a sudden vacuum was created and the tank collapsed.

Even with electric heaters, it is always advisable to have the expansion pipe taken vertically from the top of the heater with as few bends and horizontal runs as possible, so as to give a free outlet for steam in the event of the failure of the thermostat.

DUNCAN W. LOW, B.Sc., A.R.T.C., M.I.E.E., A.M.Inst.C.E.

Newarthill, Lanarkshire.

Chief Engineers' Salaries

South Shields Town Council has deferred for another year consideration of a circular from the District Joint Committee representative of local authorities and borough electrical engineers relating to the salaries of chief electrical engineers. This is the third time the matter has been deferred for twelve months by the Council.

PERSONAL and SOCIAL

News of Men and Women of the Industry

ON March 5th Mr. Butler, President of the Board of Education, announced that a committee had been appointed with Lord Eustace Percy as its chairman, with the following terms of reference:—" Having regard to the requirements of industry, to consider the needs of higher technological education in England and Wales and the respective contributions to be made thereto by universities and technical colleges, and to make recommendations, among other things, as to the means for maintaining appropriate collaboration between universities and technical colleges in this field."

The members of the committee are:—Dr. D. S. Anderson, Sir Lawrence Bragg, Mr. W. H. S. Chance, Sir Charles Darwin, Dr. E. V. Evans, Mr. Mouat Jones, Mr. S. C. Laws, Dr. H. Lowery, Mr. H. S. Magnay, Sir George Nelson, Mr. J. F. Rees, Dr. R. V. Southwell and Mr. H. Fitzherbert Wright. Mr. Maxwell-Hyslop, Board of Education, is secretary.

Mr. Geoffrey Smith, managing editor of *Flight* and *Aircraft Production* and a director of Iliffe & Sons, Ltd., is going to America in connection with the interchange of technical Press information, at the request of Mr. Oliver Lyttelton, Minister of Production.

For more than half a century **Mr. E. R. Watson,** whose retirement is announced, has served in the electrical test department of the Brush Electrical Engineering Co., Ltd., and for 42 years he has been the department's chief. At a luncheon in the senior staff canteen of the company on March 31st, Mr. H. E. Midgley and Mr. D. B. Hoseason, directors, addressing a gathering of Mr. Watson's colleagues, referred in terms of high praise to his excellent record of service. Mr. Hoseason presented him with an address bearing the signatures of a large number of his colleagues and friends, and in making the presentation said, " We are also giving you a desk upon which you are going to write the history of the company; your own history and the history of the engineering profession for the last 50 years."

Mr. Watson, in his reply, recounted many reminiscences in the history and development of the Brush company, and gave a brief history of its earlier products which included arc and incandescent lighting machinery, as it was then called, early types of turbines, road and rail vehicles, and many other things whose types have long been superseded by the modern products of the company. He had the good fortune to know men whose names rank high in electrical development, including the late Dr. Ferranti and Mr. W. M. Mordey.

The desk referred to was presented to Mr. Watson by Mr. J. H. R. Nixon, chief electrical engineer of the company, at a social gatherng held later at the Brush Sports and Social Club, at which directors and a large number of employees were present.

Sir William Stanier, who is serving as a full-time technical adviser to the Minister of Production has retired from the position of chief mechanical engineer of the L.M.S. Railway, but is being retained as consultant. He is succeeded by **Mr. C. E. Fairburn,** M.A., M.Inst.C.E., M.I.E.E., who joined the L.M.S. in 1934 as chief electrical engineer and in 1937 was, in addition, appointed deputy chief mechanical engineer, becoming acting chief mechanical engineer in October, 1942.

Mr. C. E. Fairburn

Mr. Fairburn's first association with the L.M.S. Railway Comdates back many years however, for after receiving his education at Bradford Grammar School and Brasenose College, Oxford, and serving for a short period in a general engineering shop he became a pupil at the Derby works of the then Midland Railway. In 1912 he joined the railway department of Siemens Bros. Dynamo Works, Ltd., and after the last war, in which he served as an officer in the R.F.C. and R.A.F., he returned to this company's successor, the English Electric Co., Ltd., to organise a heavy traction department for railway electrification. In 1926 he was appointed general manager of the Dick Kerr works, Preston, and in the following year he was also given control of the car works of the company in the same town.

In 1928 he became, in addition, general manager of the Stafford works and three years later he relinquished control of the three works to become chief engineer and manager of the company's traction department. He spent a considerable time abroad studying electric railways and negotiating electrification schemes and before the war he was a member of a number

Group at the luncheon held in the senior staff canteen of the Brush Co. on the occasion of the retirement of Mr. E. R. Watson. Left to right: Messrs. H. Roberts, J. H. R. Nixon, E. R. Watson, D. B. Hoseason, H. E. Midgley, P. C. Sharp and W. A. Dutton

of international bodies concerned with railway matters.

Mr. H. N. Sporborg, chairman of the British Thomson-Houston Co., Ltd., has been elected a director of the Lancashire Electric Light & Power Co., Ltd., and the Lancashire Electric Power Co., to fill the vacancy caused by the death of Mr. W. C. Lusk.

It was stated at the annual meeting of Lancashire Dynamo & Crypto, Ltd., last week that **Mr. G. E. Mason,** A.M.I.E.E., who hoped to retire in the near future, had resigned his directorship.

Mr. W. T. Branscombe and **Mr. E. A. Dowler** have been appointed directors of Pinchin, Johnson & Co., Ltd.

It was reported at the last meeting of Dundee Corporation Finance Committee that a subcommittee which has been revising the grading of salaries had submitted a unanimous report. Among the alterations in maximum salaries recommended are:—Electrical engineer (**Mr. P. Philip**), £1,250 to £1,300; transport manager (**Mr. R. Taylor**), £750 to £1,000.

Mr. E. M. Benjamin, for the past three years commercial manager of the aircraft division of the Bristol Aeroplane Co., Ltd., has now taken over the post of assistant managing director of the Philco Radio & Television Corporation of Great Britain, Ltd.

To-day (Friday) **Miss Caroline Haslett,** director of the Electrical Association for Women, is broadcasting in the B.B.C.'s Eastern Service to the women of India in the series " Pioneers of Progress," telling of British women's work in engineering and electricity. This broadcast follows an earlier one to the women of Iran, and later Miss Haslett will talk to the women of the West Indies.

Mr. J. R. Sturgeon, apprentice under the Norwich Electricity Department's training scheme, who in 1943 gained the B.Sc.(Eng.) (London) degree with first-class honours has been appointed to a post as junior station engineer with the Ministry of Aircraft Production.

Mr. G. E. Topping (C. A. Parsons & Co., Ltd.), acting chairman and hon. secretary of the I.E.E. North-Eastern Students' Section, has been nominated as chairman for 1944-45, **Mr. J. J. Rewcastle** (A. Reyrolle & Co., Ltd.) filling the position of hon. secretary.

Mr. A. R. Rumfitt has been nominated for the chairmanship of the I.E.E. North Midland Students' Section for 1944-45.

Mr. George Wyman recently completed fifty years' service with W. T. Henley's Telegraph Works Co., Ltd., and Sir Montague Hughman, chairman of the company, presented him with a framed copy of a special resolution approved by the company's board and a book of savings certificates. Sir Montague also made a personal gift to Mr. Wyman, together with one for Mrs. Wyman from Lady Hughman. Mr. Wyman's departmental colleagues also subscribed to a gift and in an accompanying letter they expressed their appreciation of the patience with which he had guided the efforts of many of them in their early days, in mastering the art of cable jointing, in which Mr. Wyman is a specialist. After the presentation, Sir Montague Hughman distributed long-service certificates to a number of employees who had completed twenty years with the company and he announced an extension of the sickness and accident benefit scheme which confers upon any hourly paid employee who holds a certificate for twenty years' service additional benefits if absent from work through sickness or accident.

Obituary

Ing. W. E. Vievhaus.—Through the medium of a Spanish technical journal we learn of the death in October last at the age of fifty-two of Ing. W. E. Vievhaus, the general director, since 1930, of the German Association of Electrical Engineers (Verband Deutscher Elektrotechniker). He was for many years connected with the Reinshagen Cable Works at Wuppertal-Ronsdorf.

Mr. Walter White, A.M.I.E.E., until his retirement three or four years ago sales engineer to Siemens Electric Lamps & Supplies, Ltd., has died at the age of sixty-six. Before joining Siemens in 1930 he was with the Metropolitan-Vickers Electrical Co., Ltd., and Holophane, Ltd.

Mr. H. W. Kefford.—The death occurred on April 5th of Mr. Henry Withers Kefford, A.C.G.I., M.I.E.E., Sheffield branch manager of the English Electric Co., Ltd.

Capt. H. L. Mittell.—News has been received in Edinburgh that Capt. Harry L. Mittell, R.E.M.E., died on active service in North Africa in March. Capt. Mittell, who was forty-three, was an assistant engineer with the Edinburgh Corporation Transport Department. In 1928 and 1929 he won the medal and prize awarded by the Municipal Passenger Transport Association for the best essay submitted on a technical subject.

Capt. O. G. Hutchinson.—The death occurred recently at Twineham, Sussex, of Captain Oliver George Hutchinson, managing director of the Baird Television Development Co.

Wills.—Mr. F. H. Rudd, a former borough electrical engineer of Rochdale, left £6,055 (net personalty £4,777).

The late **Mr. Henry J. Butterfield,** managing director of Hill, Upton & Co., Ltd., installation contractors, Oxford, left £98,120 (net personalty £90,686).

Cable Ratings

IN the latest addition to the series of printed pamphlets (price 2s.) from the Draughtsman Publishing Co., Ltd., Market Street, Rugeley, Staffs., Mr. C. C. Barnes deals with the current rating of paper-insulated cables of various modern designs. Heat flow and the determination of thermal resistance are considered first, then the method of computing the permissible continuous rating is outlined. Examples are given of detailed calculations for cables laid direct, in air and in ducts, the results obtained being summarised and finally compared. The 44-page pamphlet is illustrated with graphs and diagrams, a bibliography being appended of articles and books on the design, manufacture and applications of all types of paper-insulated power cables.

Home Planning

Views of Scottish Committee

REFERENCES to the part which electricity could play in new houses to be erected in Scotland are made in a report by the Scottish Housing Advisory Committee published last week (Stationery Office, 3s.)

On the subject of electric cooking the Committee says there can be little doubt that this means of cooking has advantages from the point of view of cleanliness over cooking by any other form of power. It has found that electric cookers have been very popular with working-class tenants where they have been installed, particularly in housing estates which were visited in the South of England. In most areas in Scotland, unfortunately, it is widely held that existing charges for electric power rule out the possible use of electricity for cooking purposes and the Committee hopes that the whole question of the comparative costs of various kinds of power will be fully reviewed by the Government. It is particularly important that radical measures should be taken to provide supplies of cheap electricity for all purposes in rural Scotland and in this connection the Committee refers to the high expectations aroused by the Hydro-Electric Development (Scotland) Act.

Duplicate Services Deprecated

It has been suggested to the Committee that in all circumstances where both gas and electricity can be readily made available at comparable cost, houses built by local authorities should be both piped for gas and tubed for electricity so that the tenant may use for cooking purposes whichever source of power he or she prefers. As the only object of providing gas supply in domestic dwellings is to enable that supply to be used for cooking and heating purposes, the Committee thinks that the adoption of this suggestion would lead to a great deal of unnecessary expenditure.

It says : " Electricity is universally to be preferred for lighting purposes and we imagine that all houses in areas where electricity is available for lighting purposes at reasonable cost would be wired for heating and cooking also. In such circumstances, therefore, we feel that the local authority in each case, in consultation with the Department of Health, would require to determine at the outset the type of power which should be used for cooking purposes and would only pipe the house for gas, if gas is likely to be much more economical for cooking and heating purposes." The Committee foresees a considerable extension of the use of electricity for cooking purpose subject to adjustments in the general level of charges.

Among the questions asked of members of the Forces and workers in industry was: " How would you like to cook, assuming the three methods (coal, gas and electricity) were available and costs comparable ? " The answers showed a clear majority for electric cooking (59 per cent. from the Forces and 57 per cent. from industrial workers). Those in favour of gas represented 31 and 36 per cent. respectively, while 5 per cent. and 2 per cent. respectively were undecided between gas and electricity, leaving an almost negligible minority for coal.

With regard to heating, it is said that the use of gas and electric radiators for occasional heating has become very common in domestic dwellings in Scotland. Subject again to reasonable charges for electricity supply, the electric radiator is almost universally preferred on the ground that if the gas fire is to be really effective it requires an independent flue. Accordingly the Committee recommends that where electricity is the normal lighting agent ample facilities should be provided in every room in the house to enable electric radiators to be used. For this purpose electric power plugs should be installed in all rooms with the exception of the bathroom, but including the kitchen. In appropriate schemes the provision of built-in panel electric fires in bedrooms without coal fireplaces might be considered.

E.A.W. Home Workers' Course

PUPILS of the Nottingham Road Senior Elementary School, Derby, recently completed the E.A.W. Home Workers' Course, and 23 girls passed the examination, including one with distinction and 18 with credit. This is the second time this particular school has taken the course, and this success, together with the fact that it is the first elementary school in the Midlands Area to show such enterprise, aroused much interest. The training of the girls was undertaken by Miss M. Topple, chief demonstrator of the Derby Electricity Department. Practical instruction was given at the electricity showrooms, and this was followed up within the school curriculum, lessons being adapted to work in with the course and examples worked out in class. The certificates were presented to the students on March 24th by Mrs. Goldberg, chairman of the E.A.W. Nottingham Branch.

Another success in the E.A.W. Home Workers' Course reflects to the credit of Miss J. Cholerton, of the Derby Electricity Department staff, who has conducted the training of a group of W.J.A.C. members, and in the examination seven out of eight candidates passed, one with credit.

Future Control Units

Possible Effect on Meter Design

AT a meeting of the Measurements Section of the I.E.E. on March 31st, a discussion on "The Consumer's Supply Control Unit of the Future and its Effect on the Design of the Electricity Meter" was opened by Mr. E. FAWSSETT and Mr. G. F. SHOTTER. The matter of codifying requirements for new buildings is so urgent that the Council of the Institution felt it was difficult to wait until the anticipated publication of the Electrical Installations Report ("Post-War Building Studies") in May, hence it had been felt valuable for the Measurements Section to discuss a matter which it had not been possible to particularise in detail beforehand. A number of exhibits were on view and certain plans had been prepared and, in addition to the views expressed in the discussion, members were asked to send in suggestions.

Steps Towards Standardisation

Mr. Fawssett said the matter was largely concerned with standardising the relative positions in space of (a) incoming service terminals; (b) meter terminals; and (c) consumer's main switch terminals. There was no inherent reason why agreement should not be reached in a matter of months if all the parties concerned would meet and make a real effort. The possibility of proceeding in two stages was suggested as follows: (a) using existing apparatus to form the neatest possible assembly, by wiring the necessary connections and then covering them in; and (b) having standardised the position in space of the meter terminals, to devise a moulded connecting block between these, the incoming service terminals and the consumer's switch—all concealed, shock- and thief-proof. Designs for a neat lay-out had been prepared by several E.D.A. Area Committees; the Study Committee had sifted these and submitted two schemes, the first for use at once—using existing apparatus—and the second, as a more ideal arrangement needing final development.

Mr. Fawssett described the salient features of the exhibits.

Mr. G. F. Shotter discussed the best load accuracy range of domestic electricity meters, *i.e.*, the lowest B.S.S. load to the highest load which could be accurately carried continuously by the meter, to within, say, the limits of the present B.S.S. There were two load ranges under the present B.S.S.:—(a) 5 to 125 per cent. (25 to 1) and (b) a long range of 5 to 200 per cent. (40 to 1). The Americans catered for an 80 to 1 range.

The question was: What was the load range of various kinds or types of domestic load? If this knowledge were available it would determine not only the load range of meters but also the number of sizes required. He thought that the 25 to 1 range was too short to record many of the domestic loads accurately. The B.S.S. long-range meter did not go far enough, but the 60 to 1 range would seem to meet many of the cases which had been investigated.

Before any discussion took place in connection with the revision of B.S.S.37 as to whether the 2½-A meter should continue to exist or whether the short-range meter should continue side by side with the long-range meter, the subject should be investigated scientifically, firstly as to the load ranges and character of domestic loads, and, secondly as to what range and sizes of meter were required to cover these ranges under the actual conditions existing.

At the opening of the ensuing discussion, it was made clear, as an extension of what Mr. Fawssett had said, that the consumers' units envisaged by the Study Committee were intended for the "Council" or subsidy type of post-war small house and MR. J. W. J. TOWNLEY, as chairman of a Panel which was also studying the matter, asked for criticisms of the exhibits and for views generally, for the assistance of that body. The hope was to get a unit which was practicable, inexpensive and suitable for the purpose for which it was intended. Some 70 per cent. of the population would be living in this type of house, but the scheme might be carried farther and a similar unit devised for the medium size house.

Various detail suggestions were made with the object of improving the designs on view and it was arranged that the exhibits should be placed at the disposal of the Panel which was continuing the study of the problem.

Radio Components

THE series of war-emergency specifications, codes and preferred lists of all radio components required by the Services, which is being prepared by the Inter-Services (Communications) Components Technical Committee, is being published in loose-leaf form (6d. each) with a special binder (4s. each) to accommodate them by the British Standards Institution, 28 Victoria Street, London, S.W.1. A subscription scheme is available. The nine (BS/RCS) documents already obtainable include a general specification for all components and test schedules for fixed resistors and capacitors of various kinds. They are intended primarily to be used for contracts placed by the I.S.C.C., the Admiralty, the Ministries of Supply and of Aircraft Production, but may also be employed for other appropriate purposes.

COMMERCE and INDUSTRY

Engineering Employees' Wages. Charges for Meters.

Engineers' Wage Claim Rejected

ON April 5th the Engineering and Allied Employers' Federation gave a detailed reply tothe engineering unions' claim for a further advance of 10s. per week on basic rates, explaining why it was not possible to accede to the demand. The representatives of the unions stated that they would take steps to place their case before the National Arbitration Tribunal.

Meter Rents

In the House of Commons on April 6th, Mr. De La Bere raised the question of the charging of meter rents by gas and electricity undertakings about which he said he had had many thousands of letters of protest. Roughly speaking, the cost of an electricity meter was 30s. and the householder paid 10s. a year or more in rent so that in a period of three years the meter had been purchased in rent outright. Many of these meters were twenty years old and they had been paid for some five or six times over. Several million pounds a year were being paid in meter rents.

Mr. Tom Smith, Joint Parliamentary Secretary Ministry of Fuel and Power said the Minister was very sympathetic on this point. There was some justification for the complaints. The Minister was considering a good many aspects of the problem of gas and electricity distribution. While separate legislation could not be promised on this particular point he assured the House that in considering these other questions this point would not be forgotten."

Lighting Summonses

At Marylebone Police Court last week Country Farmers, Ltd., of 262-4, Edgware Road, London, were fined £100 with 25 guineas costs on summonses for using electric lighting for the purposes of advertisement at their Edgware Road premises, for using more than 1½ W per sq. ft. to illuminate their Baker Street shop on two dates, and for wasting electricity at their shop in Kilburn High Road. Fines amounting to £100 were also imposed on Arthur Cornwall Smith, a director of the company, on summonses for using more power than permitted, and Sydney Cowen, Althorp Road, Wandsworth Common, an assistant, was fined £15 for aiding and abetting the company in wasting electricity.

Apprentice Training

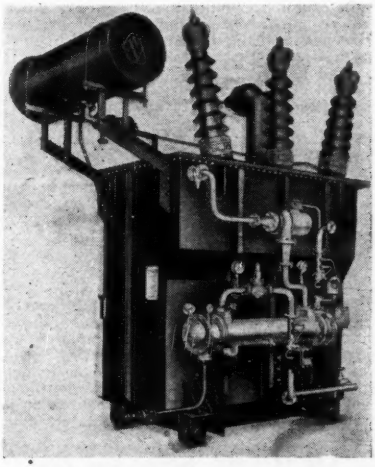
Another company interested in our "Engineers of the Future" series, Sigmund Pumps (Great Britain), Ltd., Team Valley, Gateshead, has sent us a brochure describing the plan for the training of apprentices which it has instituted at its works. The scheme has a threefold aim: To educate boys to become craftsmen; to train technical staff for the drawing office; and to train young men for administrative or managerial duties. Arrangements are made for apprentices to attend the Gateshead Senior Technical and Commercial Institute or Rutherford College during working hours and great attention is paid to the selection of boys, to their health and physical welfare and to their education in citizenship. Encouragement is given to boys showing special ability to continue their education and sit for an engineering degree. The brochure is attractively illustrated.

District Heating

District heating will be among the subjects covered by an exhibition to be held by the Ministry of Works at 5, Old Palace Yard, Westminister, from April 20th to 28th, when photographs, architectural drawings, tools and other materials collected in the United States by the Building Mission appointed by the Minister of Works will be on view. Methods of obtaining speed in building will include information given to contractors before tendering, time and progress schedules and building methods.

Transformers for Export

Four 88/11-kV three-phase, 50-cycle transformers have recently been completed by the Metropolitan-Vickers Electrical Co., Ltd., for service abroad, two being rated at 5·5 MVA and two at 4 MVA. They are weatherproof and



"Metrovick" 4-MVA 88/11-kV weatherproof transformer from the h.v. side

each is star/interstar connected, the windings being fully insulated and suitable for withstanding the British Standard test voltage of 1 + 2 E kV for one minute, which means 177 kV for the higher voltage winding and 23 kV for the lower.

Three 88-kV class oil-filled condenser bushings are provided for the line leads and a 33-kV porcelain bushing for the high-voltage neutral point. As the neutral point bushing is of a comparatively low voltage class, the windings are disconnected from the bushing during the

high-voltage test. The low-voltage porcelain bushings are enclosed in a cable-sealing box and are suitable for taking four single-core p.i.l.c.s.w.a. cables.

The transformer is type OFW, artificially cooled by forced circulation of the oil through a separate water-cooled oil cooler. To make it compact and self-contained the whole of the cooling equipment is mounted on one side of the transformer tank, including an oil circulating pump, a cooler and flow alarm device.

The oil circulating pump is of the glandless type, the motor windings being enclosed in the same casing as the pump and filled with transformer oil; leaking glands are thus entirely eliminated. To prevent contamination of the oil by the ingress of water in the event of any leak developing inside the cooler, the oil pressure in the cooler is kept above the circulating water pressure.

Wages in the Contracting Industry

The National Joint Industrial Council for the Electrical Contracting Industry states that the cost of living (war) addition to wages is to remain at 4¾d. per hour up to and including the second pay day in July. Similarly the hourly addition to the pay of operatives under the age of 18 remains at 1¼d. and that for men between 18 and 21 remains at 2¼d.

Letchworth Exhibition

An exhibition, entitled "Letchworth To-day and To-morrow," is being held by the First Garden City, Ltd., in conjunction with Letchworth Urban District Council from April 17th to 22nd inclusive. It will be officially opened at 3 p.m. on the first day by the Minister of Town and Country Planning, Mr. W. S. Morrison. The electricity undertaking will have on view an electric kitchen planned for simplicity for those of moderate income. There will also be novel statistical charts, a large-scale coloured drawing—coal to electricity, the "electric eye" for counting attendances, as well as numerous photographs of home, industrial, farm and general applications.

Profit-Sharing Scheme

Hirst, Ibbetson & Taylor, Ltd., Manchester, are instituting a scheme for the current financial year by which a fixed proportion of the profits will be divided amongst the company's employees in proportion to their salaries. Profit will be estimated each month and a dividend will be paid during the following month. A final (thirteenth) dividend will be paid when the profit for the year has been accurately determined.

Use of Lead, Solder and Zinc

Economy Memorandum No. 1, "Use of Lead and Solder," has been revised to ensure that the supplies of lead available for building shall be used to the best advantage, and the Ministry of Works announces that, by agreement with the Non-Ferrous Metals Control, the release of lead pipe and sheet will be regulated as shown in the revised E.M.1. Similarly, E.M.7, "Zinc Roofing and Flashing," has been revised. These two revisions supersede E.M.1 and E.M.7, pages 21-23 and 29-30 of "The Standard of Wartime Building," published by the Stationery Office for the Ministry of Works in May, 1943, users of which can obtain a copy of the revisions from the Directorate of Building Programmes, Room 705, Ministry of Works, London, S.E.1.

E.M.1 covers the use of lead for X-ray protection. For such purposes lead may be used only for doors, and the frames of windows and doors; for partitions between treatment and other rooms barium sulphate plaster must be used; this is obtainable from Philips Lamps, Ltd., Century House, Shaftesbury Avenue, W.C.2, or from the Malehurst Barytes Co., Ltd., Minsterley, Shrewsbury. The protective value of barium plaster as compared with lead varies with the voltage of the tubes as follows, the approximate thickness of barium sulphate plaster stated being equal in protection to 1 mm. of lead:—100 kV tube, ¼ in.; 200 kV, ⅜ in.; 400 kV, ½ in.; 1,000 kV, ⅝ in. Per yard super of plaster 135 lb. of barium sulphate is required for 1 inch thickness.

Portable Vulcanisers

The Machinery, Plant and Appliances (Control) (No. 6) Order, 1944 (S.R. & O. 1944 No. 276) removes from control under the No. 3 Order of 1942 bench or portable vulcanisers the price of which to the customer in the open market on normal terms is less than £25.

Acquisition of Machine Tools

S.R. & O. 1944 No. 277 made by the Board of Trade amends the general licence under the Machinery, Plant and Appliances (Control) (No. 3) Order, 1942. The effect is that no licence under the Order is required in respect of the acquisition of any such machine tools as can be obtained only under the authority of a licence granted or direction issued by the Ministry of Supply.

Industrial Administration

A conference on "Management and Society" will be held by the Institute of Industrial Administration from Friday, April 28th to Sunday, April 30th, at the Waldorf Hotel, London, W.C.2. The address on "Management and the Community" at the conference luncheon on April 29th will be given by Sir Lynden Macassey, K.B.E., K.C., and the chairman will be Sir Francis Joseph, Bt., K.B.E., D.L. (president). Other papers will be on the subject of "Industrial Economy," "Management and the State," "Management in the Small Firm" and "Management and Research."

Conduit-making Machine Wanted

A London firm of agents has asked us, on behalf of some Australian clients, to put it into touch with British manufacturers of a machine for producing welded conduit (¼ in. to 1 in.) from steel strip in a continuous process. We will be pleased to forward replies from any readers interested in the matter.

Changes of Name

The name of J. Browett Lindley (1931), Ltd., Coburn Works, Dunham's Lane, Letchworth, Herts, has been changed to Browett Lindley, Ltd.

Daly & Rose, Ltd., West Lodge Works, The Green, Ealing, W.5, will in future be known as Daly (Condensers), Ltd.

Kitchen Units

Plans for Mass Production

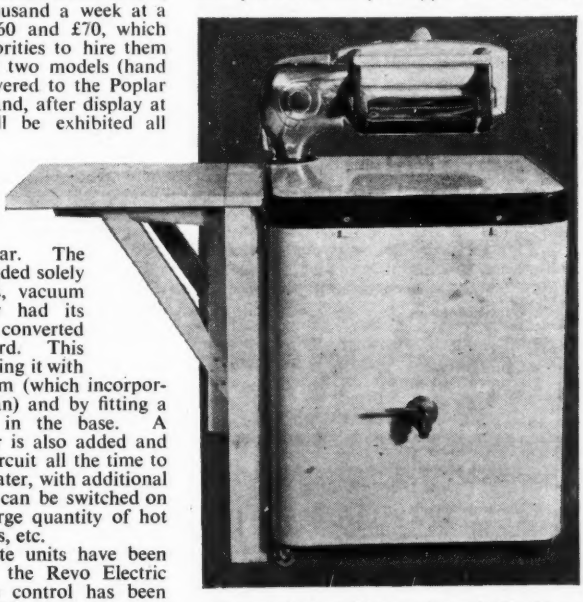
PLANS are almost complete for the mass production under provisional patent of the all-electric kitchen units which Mr. R. Illingworth, Poplar borough electrical engineer, has designed. Mr. T. Fletcher, chairman and managing director of Burnley Aircraft Products, Ltd. (an associate company of Universal Boilers & Engineering Co., Ltd.), who are to undertake the manufacture, aims at producing a thousand a week at a market price between £60 and £70, which would enable local authorities to hire them at 5s. a week. The first two models (hand made) have just been delivered to the Poplar Electricity Department and, after display at its showrooms, they will be exhibited all over the country.

The design shows a number of improvements compared with the original model described in our issue of July 16th last year. The cupboard, originally intended solely to accommodate brooms, vacuum cleaner, etc., has now had its utility increased by being converted into an airing cupboard. This has been done by connecting it with the ventilating duct system (which incorporates a 25-W Vent-Axia fan) and by fitting a 120-W heating element in the base. A 15-gal. Sadia water heater is also added and a 500-W element is in circuit all the time to give a small amount of water, with additional 2,500-W elements which can be switched on by a foot control if a large quantity of hot water is required for baths, etc.

The oven and hot-plate units have been specially constructed by the Revo Electric Co., Ltd. Thermostatic control has been provided for the oven, which to reduce cost has a normal side-opening door, not drop-down as originally intended. The hot-plate equipment includes two hotplates, 8-in. and 6½-in. diameter respectively, and a 10-in. by 7-in. grill-boiler. The normal capacity of the Electrolux refrigerator (1½ cu. ft.) can be increased to 2½ cu. ft. by dispensing with the small cupboard above, and shelves are now provided in the cupboard holding the ironing board. In the final design the clock face will be embossed in the trunk panelling.

With the main assembly constructed of 17-gauge anodised aluminium, the unit will weigh only 3½ to 4 cwt. complete and have a very attractive finish. The cooker, etc., are constructed of acid-resisting black iron, with vitreous enamelling only on the front. Although the whole apparatus requires a wall space of 10 ft. 7½ in., the unit is extremely adaptable and individual components can be employed as convenient. In fact seventy-two different arrangements have been devised; the smallest, comprising only the oven, hot-plate unit and refrigerator, takes a wall space of only 5 ft. 6 in., and will cost £30–£35.

Burnley Aircraft Products, Ltd., have also now produced the prototype of an electric



Both clothes and dishes can be washed in this machine

washing machine which, it is claimed, can be used not only for clothes but for dishes as well. Instead of an agitator a high-velocity pump is used to produce a turbulence of the water which, it is stated, is so powerful that soap is unnecessary. The eliminating of moving parts obviates risk of damage to fabrics. A wringer with rubber rollers and a quick safety release is driven by the same ¼-HP motor as is used for the pump. The whole equipment is made of pressed metal finished in pleasing colours. Standing 2 ft. 6 in. high, it is 2 ft. square and in addition to an inner circular lid has a metal table top, with provision for fixing a wooden working table on any side. The proposed cost of the apparatus is £14.

Argentine Electrical Trade

Import Details for 1942

STATISTICS for 1942 of the foreign trade, by countries, of the Argentine Republic have been published in Buenos Aires. From these the values of the imports of the principal electrical goods have been extracted and are given below, with a note of increase or decrease compared with 1941. (£1 = 17 pesos.)

The decline which took place in nearly every branch of the import trade was attributable to difficulty in obtaining overseas supplies rather than to any decrease in demand. The loss of business by the United Kingdom seems to have been more marked than that by the United States; Germany was still able to carry on a certain amount of trade. Sweden's share increased in a number of lines.

Class	1942 Pesos (000)	Inc. or dec. on 1941
Fan motors—	79	+ 12
From United States	75	+ 35
„ United Kingdom	1	— 25
Motors up to ¼ HP—	56	— 44
From United States	52	—
„ United Kingdom	1	—
Motors and dynamos over ¼ HP—	1,536	+ 23
From Germany	79	+ 64
„ Brazil	35	— 15
„ United States	646	+ 295
„ United Kingdom	326	— 199
„ Sweden	418	— 50
„ Switzerland	32	— 65
Cable and wire up to 5 mm., covered with cotton, rubber, etc.—	332	— 308
From United States	197	— 202
„ United Kingdom	130	— 103
Ditto, over 5 mm.—	68	— 209
From United States	1	— 14
„ United Kingdom	67	— 195
Cable and wire up to 5 mm., lead-covered—	210	— 95
From Canada	93	— 130
„ United States	20	+ 19
„ United Kingdom	10	— 40
„ Sweden	88	+ 57
Cable and wire over 5 mm., lead-covered—	19*	— 802
Cable and wire, silk-covered—	49	— 51
From United States	46	— 39
Wire, electrical, enamelled—	143	— 188
From Canada	26	— 7
„ United States	114	— 67
„ United Kingdom	3	— 102
Telephone cables, iron or steel—	38	— 834
„ From United States	33	— 839
„ Sweden	4	+ 4
Telephone cable, underground—	320	— 2,860
From Brazil	18	— 86
„ United States	2	— 626
„ United Kingdom	273	— 2,096
„ Sweden	24	— 53
Electrical flex—	175	— 60
From Canada	1	— 45
„ United States	121	+ 70
„ United Kingdom	49	— 84
Telephones without coils—	52	+ 7
From Sweden	44	+ 9
Telephones with coils—	186	— 27
From United Kingdom	2	— 5
„ Germany	50	+ 46
„ Sweden	131	+ 59
Telephones, magneto—	54	— 80
From Sweden	50	+ 9
Telephone materials—	663	— 110
From Canada	2	—
„ United States	429	— 15
„ United Kingdom	166	— 62
„ Sweden	58	+ 48
Telegraph material—	65	+ 7
From United States	10	— 18
„ United Kingdom	31	—
Heaters, toasters, kettles, etc.—	9	— 6
From United States	6	— 2
„ Germany	2	— 3

Class	1942 Pesos (000)	Inc. or dec. on 1941
Switches, circuit-breakers, cut-outs, fuses, etc.—	354	— 84
From Brazil	56	— 35
„ United States	113	— 76
„ Germany	55	+ 55
„ United Kingdom	98	+ 16
„ Switzerland	12	— 7
Vacuum cleaners—	117	— 53
From United States	8	+ 7
„ Sweden	93	— 73
Insulating tape—	18	— 44
From United States	11	— 19
„ United Kingdom	7	— 24
Change-over switches—	469	— 159
From Germany	35	+ 31
„ United States	30	— 6
„ United Kingdom	248	— 208
„ Sweden	150	+ 30
Electric incandescent lamps—	684	— 53
From Brazil	9	— 24
„ United States	293	+ 148
„ Japan	2	— 185
„ United Kingdom	256	— 40
„ Sweden	121	+ 80
Current meters—	2,090	+ 509
From Canada	107	— 46
„ United States	27	— 69
„ United Kingdom	6	— 59
„ Sweden	305	— 10
„ Switzerland	1,620	+ 853
Distribution boards—	44	— 183
From United States	14	— 35
„ United Kingdom	23	— 136
„ Sweden	1	— 11
Accumulators—	23*	+ 16
Accumulator and battery parts—	729	— 553
From Canada	113	— 167
„ United States	451	— 424
„ United Kingdom	65	— 12
Batteries—	11	— 51
From United States	4	— 15
„ United Kingdom	7	— 35
Cells for batteries and accumulators—	28	— 55
Ammeters and voltmeters—	58	— 10
From United States	39	— 14
„ United Kingdom	2	— 8
Glass bulbs for lamps and valve manufacture—	439	— 137
From Brazil	56	— 54
„ United States	383	— 83
Electrical materials, unspecified—	2,260	— 806
From Germany	103	+ 88
„ United States	1,594	— 743
„ United Kingdom	366	— 167
„ Switzerland	143	+ 25
Accessories for underground cables—	17*	— 61
Insulating tubes—	7	— 10
From United Kingdom	1	— 12
„ United States	4	+ 2
Radio-telephone apparatus—	3,193	— 1,786
From United Kingdom	154	— 157
„ United States	3,009	— 1,585

*Mainly from U.K.

Post-War Planning

I.E.E. Discussion on Electricity Supply and Distribution

THE supply and distribution sections of the Report prepared by Sub-Committee No. 3 of the I.E.E. Post-war Planning Committee were discussed informally at an extra meeting of the Transmission Section on March 28th. The third part of the report, which deals with installation aspects, is to be similarly debated at a later date by the Installations Section.

Mr. P. E. RYCROFT opened the discussion with the remark that there were very few industries in which more systematic and scientific planning had been applied than in the electrical industry. The chief difference between pre-war and present day efforts was that the former consisted very largely of individual endeavours not formally correlated, whereas now the demand was for mass planning. It would be quite wrong to allow the general public to think that the industry was in such a chronic state of mismanagement that very large scale reorganisation was necessary.

Cost of Voltage Standardisation

Sub-Committee No. 3 had devoted eight pages of its Report to advocating the standardisation of the voltage of consumers' supplies, but he thought that a number of those pages might have been more usefully employed in saying how it was proposed to provide the finance to carry into effect what had been recognised as an essential step many years ago. The cost of effecting the necessary changes would be about £17,500,000; repayment of interest and principal would represent about £1,500,000 per annum. With an annual income for the whole industry of about £100,000,000 it should not be difficult for the industry within itself to provide that amount of money for the twenty years probably necessary to liquidate the capital sum. The consumer would have to find the money and, in Mr. Rycroft's view, rightly so.

The sum of £17,500,000 could apparently be materially reduced because it included the cost of altering those systems which at present were very near to the required standard. Where there was a difference of only 10 or 20 V either way, undertakings should receive legislative authority to give six or twelve months' notice to consumers of the proposed change, so that a reasonable time for them to replace their lamps and apparatus would be allowed, thus relieving the undertaking of the cost. The undertaking should not be compelled to give new lamps and small pieces of apparatus in exchange for others that were often three parts worn out.

With regard to "availability of supply," the Report gave Mr. Rycroft the impression that there were a large number of consumers, particularly in rural areas, clamouring for electricity which they could not get; in his view the true facts offered very little evidence of that.

The rural area with which he himself was familiar was of 250 sq. miles and contained 70 separate villages with a population of 40,000 and some 10,500 houses; 7,800 of those premises had already been connected in thirteen years and the total capital expenditure for all purposes, including services, was £250,000, without any subsidies. The present revenue was £63,500 per annum, or a little over 25 per cent. on the capital invested. By the system of finance adopted, practically half of the original capital had been repaid and it was estimated that with a post-war expenditure of a further £90,000 all properties would be served within those portions of the area to which supplies were not at present available. The total supplied was 8½ million kWh per annum, of which half was supplied through prepayment meters. The two-part tariff was on the basis of 15 per cent. of the rateable value, with a running charge of ¼d. per kWh, and he expressed a strong preference for the rateable value basis as compared with the floor area basis of assessment of fixed charge. The maximum flat rate was 5½d. per kWh and in both cases there was a war surcharge of 20 per cent.

Overhead Lines

He regretted that the Committee had not made some suggestions for standardised charges for wayleaves. In another paragraph of the Report there was an underlying suggestion that overhead lines were an essential and permanent feature of rural supply, which Mr. Rycroft did not accept and urged that in many cases underground distribution offered real advantages, judged on a long-term view. In the area he had mentioned there were 119 miles of low-voltage distribution network with only 35 miles of low-voltage overhead lines.

The value of mechanised farms to the building of load on the electricity undertaking he described as very largely illusory and, in support, quoted figures of the small demand from that source in the area already referred to. The value to the undertaking of the farm load lay in the increasing use which the farmer's wife made of electric cooking, water heating, etc.

He was doubtful of the suggestion in the Report that services should be supplied free of

charge and described the suggestion with regard to under-eave construction as being highly controversial and certain to meet with strenuous opposition from individualist householders entrenched in their " castles."

Finally, Mr. Rycroft remarked that the recommendations in the Report were presumably for the guidance of Ministries, but he did not consider them emphatic enough. Indeed, he thought the whole matter had been approached with some timidity and was emphatic that subsidies of any kind were not an essential feature of successful schemes of rural development.

Among the contributors to the discussion were the chairman of the Post-War Planning Committee—who was also chairman of Sub-Committee No. 3—and individual members of the specialist Panels set up for the detailed consideration of various aspects of the Report and thus an opportunity occurred for the views set out to be re-stated and elucidated. On the other hand, alternative views were not lacking and it was stated on behalf of the Committee that free discussion of the Report, both in London and the provinces, would be welcomed.

The Committee's aim was to group together a number of matters on which, so far as it could judge, there was fairly wide agreement in the industry, to the end that the proper authorities could take effective action. The advocacy of completion of voltage standardisation as a national industrial plan was emphasised as a major plank in the programme of recommendations.

Criticisms of the Report

To set out the main criticisms of the Report: it was said that difficulty would be experienced in convincing owners of 250-V systems that they would gain by the change, as there would be a loss of some 15 per cent. in system capacity for which no compensation was suggested. The view was emphasised that the Committee should have made definite proposals as to how the change-over was to be effected; there was not very much wrong with the present powers of undertakings, if rightly used.

A further statement from the Institution of a more imaginative and constructive nature than that contained in the Report was asked for by one speaker and it was urged that there should be some scheme by which the increased value of land due to supplies of electricity becoming available should contribute towards the cost of taking electricity into the rural areas.

In the view of another speaker, the figure of £2 18s. given in the Report as the average cost per kW connected for increasing the voltage from below 220 to the proposed standard was regarded as high and information was sought of the type of undertakings from which that average was derived. A case was mentioned in which the cost had worked out at £1 2s. per kW connected, some 17,000 kW being involved.

It was suggested that the Report was inconsistent in advocating standardisation of voltage without at the same time dealing with the change-over from DC to AC, which would considerably increase the figure of £17,500,000. Another general point was that voltage standardisation (complete or partial, leaving 250 V as a secondary standard) would be beneficial to manufacturers as well as to undertakings and consumers, and it was thought not to be unreasonable to expect lamp makers, motor manufacturers and heating element makers to assist by quoting specially favourable terms for replacing, or for re-winding, non-standard articles. It was pointed out that some progress was made in this direction before the war. A demand was made for sound engineering rather than financial or political expediency in dealing with this problem, and it was claimed that the supply industry was proceeding very satisfactorily on those lines before the war.

Subsidies Opposed

Emphasis was laid on the fact that capital costs of rural supplies were often twice those which applied in urban areas and the Committee was criticised for not taking this sufficiently into account and for making no allowance for depreciation, repairs and maintenance. The latter charges were said by one speaker, who claimed wide experience, to be just as heavy in rural work as the capital charges. Subsidies for rural development were opposed, if only for the reason that they would mean Treasury control. Attention was called to the lack of statistics with regard to rural electrification and the concrete figures given by Mr. Rycroft were welcomed.

Another case was mentioned of a rural area of 4,300 sq. miles containing 220,000 premises, in which supply was said to be available to 80 per cent. of the premises and 176,000 were connected, including 3,100 farms of which 600 were completely isolated with no other building within a half mile.

Mr. Rycroft said that he felt it to be no part of his duty to offer a reasoned reply to all the points that had been raised. The members of the Committee who had spoken had not disagreed with him to a very great extent and the general level of the discussion had been helpful and effective.

Portuguese Plant Interconnection

THE Portuguese journal *Revista da Ordem dos Engenheiros* reports that work has been completed on the linking together of the Tejo power station (Lisbon) of the Companhias Reunidas Gas e Electricidade and the Cachofarra station (Setubal) of the Companhia Uniao Electrica Portuguesa. The work included the laying of three single-phase cables across the bed of the river Tejo.

Electro-Farming Prospects

Methods of Meeting the Needs

ELECTRICAL aspects of farm mechanisation are discussed in a paper by MR. C. A. CAMERON BROWN (Electrical Research Association) presented before the Installations Section of the Institution of Electrical Engineers yesterday (Thursday).

The author presents a general account of current practice, but does not deal with operations that have already become well-established; his main attention is concentrated upon the less common ways in which electricity is used, those which are the subject of some controversy, and others that promise well for the future though still in the early stages of development. Emphasis has been placed on trend, rather than on facts and figures.

Most of the old shibboleths of comparative fuel and Diesel-oil costs have disappeared, ease of handling, reliability and labour saving being the overriding reasons why farmers choose to employ electricity. Between the two wars there was a reduction of the mechanical power utilised in and about farms, largely due to the gradual diminution of the preparation of foodstuffs; stock feeding requirements have been more easily satisfied by the purchase of ready-prepared rations.

Grinding Machinery

Conditions created by the war have caused a widespread increase in demands for farm grinding equipment. The provision of a standard machine is complicated by demands for different types of output for the same class of feeding. This shows that there is no royal road to satisfying farmers' requirements, which often differ under apparently identical conditions.

Next to actual field operations, the preparation of food for livestock is probably the most important of the fundamental farming operations. It includes the grinding, or crushing, of grain and mixing meal; the hammer mill has several advantages over the plate mill, but there have been substantial obstacles to its extensive installation. The position of the hammer mill has been radically altered as the result of initiative and activity on the part of the electrical industry itself (E.R.A. Report W/T4–1940) making commercially available a machine which is automatic, low loaded and low priced and suitable for the whole range of farm grain grinding.

One of the most laborious manual processes is the mixing of foodstuff ingredients, horizontal and vertical machines for which are described; but much of the convenience of individual labour saving appliances can be lost if they are not suitably placed in relation to one another. The author suggests that the lay-out at Rothamsted farm might very well serve as the basis for new installations and he describes the elimination of intermediate handling on a large Mid-Cheshire dairy farm by the installation of an ingenious overhead rail transporter system for distribution.

The related processes of chaff cutting and root slicing have not regained their position in the same way as grain crushing. The feeding of hay, straw and roots whole had made headway, and there is no sign of any appreciable tendency to revert to machining.

Mechanised Threshing

Threshing has lost prominence since the advent of the combine-harvester, which cuts and threshes in one operation on the field, so that the prospect of any appreciable increase in number of electrically-driven independent threshers is not bright. But the author can vouch for a strong feeling of preference, especially among younger farmers, for independence in threshing and attraction to completely mechanised plant. The deterrent is high cost of installation, while the electrical load is not of such a nature as to make it economically attractive on a rural distribution system. The author mentions the availability of a range of small hardly known threshers, with complete sorting and cleaning apparatus for delivering fully-graded samples, which could be operated by two men or women, with perhaps an occasional third.

However, for combine-harvesting to be successful, even in the drier parts of this country, it is now considered essential to employ grain driers, for which electric power is recognised as pre-eminently suitable. Thus the threatened loss, by eliminating threshers, of a possible application of electricity may be reversed by later developments and, moreover, the operational benefit of utilising electric power for drying is such that in obtaining the supply the farmer will go to considerable expense. The main requirements for grain drying are stated and available types of equipment are described. Heat is generally furnished by crude types of coke and crude-oil burners.

Crop-drying has been obscured by the publicity given to grain drying, but a large section of the farming community is more concerned with drying corn in the sheaf in order to bring it to the threshing stage, which aspect has not received any attention. Grass drying has hardly lived up to its earlier

bright promise, although it is still quite often practised on a somewhat more moderate scale than that once advocated. In this case also electric power is always asked for. Since grass is generally wetter than grain, its drying is slower. and more expensive

It has never been possible to give an encouraging answer to the question whether electric heating could be employed. A somewhat courageous step in all-electric drying has been taken by the Bedford Corporation in conjunction with a local farmer at Haynes (182 kVA drying load) and so far experience gained with the plant has completely satisfied the farmer.

Electricity in the Dairy

Dairy farming has been persistently brighter and more progressive throughout even the leanest period. The question is no longer whether machine milking is satisfactory (it is expanding at a rate limited only by availability of materials), but how best to ensure the most hygienic handling of the equipment. Practically all milking plant is now operated on the suction pump principle.

The degree to which electricity is employed, when available, is governed by the individual farmer's interpretation of "economics." In an increasingly large number of cases milk-producing plant is all-electric, even to the heating of washing water and raising of steam for sterilising in the dairy, because of its essential cleanliness, labour saving and reliability compared with coal. Thus the main expenditure of energy is in heating, which offers one of the biggest and best outlets; farms with herds of from 20 to 40 cows can account for from 5,000 to 10,000 kWh per annum for dairy heat alone.

It is now officially realised that the bulk of the milk produced on farms in this country is insufficiently cooled. Also the use of mains water for cooling is sometimes both embarrassing to waterworks and expensive to farmers. Everything points to a "tremendous" expansion of farm cooling plant sooner or later; it may come suddenly under official direction. Milk is usually cooled partly by water and partly by refrigerant; the author advocates the elimination of the water stage. Full use of refrigeration would roughly double the present consumption of 20 to 30 kWh per cow for cooling, which would not be serious at the running costs now available on farm tariffs.

Pending Government legislation promises to make milk pasteurisation compulsory, which opens up the way for consideration of the electrical method in much smaller units of plant than hitherto. Nothing more can be said at the moment, but possibilities are not being overlooked.

A significant trend is the utilisation of a centralised "parlour"; instead of suction piping throughout cowsheds for milking *in situ*, cows are led in turn to a special room. This means reduction of the area in which maximum hygienic precautions have to be exercised, while permitting milk to be "auto-released" through the cooler to churns and bottles without any intermediate handling. It also facilitates auto-recording of the weighed output from each cow. The principle has been applied on quite a modest scale without elaboration for herds as small as 15 cows.

Farmers have not, in general, been slow to adopt demonstrably sound methods, but have been strongly reluctant to utilise labour saving methods in and about their farmyards. The philosophy with which they tolerate cumbersome and slow manual operations always astonishes engineering observers. Particularly surprising is the amount of sheer lifting which is done manually, practically no use being made of self-contained transporting hoists. Such complacency is gradually being shaken as more girls are employed and even men are finding that the extra time involved makes their jobs harder. The farmer's reception of fresh ideas has been quickened during the war by the shortage of labour and its rising cost.

Overhead Line Materials

METAL conductors of various kinds for overhead power lines are the subject of a paper by MESSRS. G. W. PRESTON (Copper Development Association) and H. G. TAYLOR (formerly of that Association), submitted to the Transmission Section of the Institution of Electrical Engineers on Wednesday last.

The creep of conductors on low- and medium-voltage copper lines and their initial non-elastic extension are considered in relation to their effect on sags and compensation for this by an increase in erection tension as an alternative to pre-stressing. A typical stress/strain curve for copper conductors is given.

Information on the annealing characteristics of hard-drawn copper and copper-alloy conductors is included, with special reference to the effect of impurities in the metal. Maximum safe operating temperatures for such conductors are discussed, together with maximum permissible current loadings.

Hollow copper conductors of various types for super-voltage lines are described and some of their characteristics are enumerated. The features of cadmium-copper conductors are dealt with in comparison with other types of high-tensile overhead conductor. Steel-reinforced copper conductors receive special attention, particularly in regard to the protection from corrosion of the steel wires. Results of a long-time investigation are given in full, with conclusions and recommendations. Copper-clad steel wires, their characteristics and use as reinforcement in copper conductors, are discussed.

Details are given of developments in the application of compressed sleeve joints to copper and copper-alloy conductors. Suitable joints for cadmium-copper and steel-cored copper conductors are described and test results given.

ELECTRICITY SUPPLY

Scottish Hydro Projects.

Berwick.—STREET LIGHTING CONCESSION.—At a meeting of the Town Council, it was reported that the Scottish Southern Electric Supply Co., Ltd., had been approached for a reduction in the payment made to them for wartime lighting and that the company had agreed to accept a payment of £100 annually.

Birkenhead.—EXTENSIONS. — The Electricity Committee is to provide a supply to Thornton Hough at a cost of £416 and an additional supply to Martin Hearn, Ltd., at Hooton, at a cost of £946, payable by the company.

Cheltenham.—FARM SUPPLIES.—Application is being made by the Electricity Committee for sanction to erect overhead lines in order to provide supplies to Stockwell Farm and Hill Barn, Cowley, and Ullenwood House and Farm, Coberley.

Great Yarmouth.—INCREASED CHARGES. — An increase from 20 to 33⅓ per cent. in the war addition to charges has been announced by the Electricity Department, to take effect as from the meter readings for the March quarter. This increase does not apply to apparatus on hire or meter rents, and tariffs with a coal clause are not affected.

Guildford. — REFUSE DESTRUCTION. — Steam plant at the destructor works is to be converted to electric drive at an estimated cost of £700 and the Sanitary Committee also proposes to purchase an electrically driven compressor set at an estimated cost of £1,034.

OVERHAUL OF PLANT.—The borough electrical engineer recently reported to the Electricity Committee that the overhaul of the boiler house plant would involve an outlay of £4,000 or £4,500. Part of the work will be done by the Department, but owing to labour scarcity it may be necessary to call in outside contractors.

MAINS.—The Electricity Committee is to lay mains at a cost of £225 to improve the supply in the Sandy Lane area and extend mains and install a transformer to provide additional supply to Nelco, Ltd., at Shalford, at a cost of £717.

Hull.—LOAN SANCTION.—The Electricity Committee has obtained sanction to borrow £2,363 for plant.

London.—PREPARING FOR CHANGE OVER.—St. Pancras Electricity Committee reports that at present approximately 29 per cent. of the consumers are connected to the AC distribution system. It is recommended that new consumers coming into the area and supplied from the DC system shall be notified of the desirability of their providing lamps and apparatus suitable for the standard supply voltage.

SUPPLY EXTENSIONS.—Arrangements have been made by the St. Pancras Electricity Committee to provide the Aerated Bread Co., Ltd. with an emergency standby supply of approximately 200 kW. The Committee will install mains and the company will contribute £550 towards the cost. The Committee also reports that a Government Department proposes to utilise a site outside the undertaking's area of supply and requires a supply of 25 kW. The authority concerned is unable to afford a supply of three-phase energy at this point and has agreed to a Fringe Order so that the supply may be given by the St. Pancras undertaking.

Further Cuts in Eire.

PLANT MAINTENANCE. — The Southwark Electricity Committee reports that the summer maintenance programme will include the complete rewiring of the boiler house and engine room and alteration to the station distribution; general repairs to cooling towers; reconstruction of spare draught fan and commissioning; completion of continuous runway over boilers to facilitate operation and maintenance and prevent danger; and repairs to boiler plant stack.

Manchester.—LOANS.—Sanction has been obtained by the Electricity Committee to raise loans for mains, substations and plant, buildings and ash-handling plant.

Middlesex.—ELECTRIC COOKERS.—The County Health Committee is to install electric power cables and cookers at the staff cottages at the White Webbs Institution at a cost of £90.

Ossett.—EXTENSION OF TIME.—The Electricity Commissioners have made an Order extending for three years the period after the expiration of which, by twelve months' previous notice, the Corporation may require the re-transfer to itself of the undertaking authorised by the Ossett Electric Lighting Order, 1898.

Scotland.—WATER-POWER PROPOSALS.—The projects listed in the North of Scotland Hydro-Electric Board's development scheme with the largest potential output will use the waters of the Inverness-shire Garry, the Morriston and Loch Hourn (350 million kWh); the Orrin, Meig, Connon and Glen Beg (350 million kWh); the Tummel and Perthshire Garry (300 million kWh); and the Affric, Cannich, Farrar, Glass and Beauly (440 million kWh). Other projects have annual outputs ranging from 4 million to 260 million kWh. Distribution schemes are being prepared for Great Cumbrae, Bute, Cowal, Morar, Lochalsh, Gairloch and Aultbea, Lochinver, Ullapool, and Orkney and Shetland.

Southport.—RATE CONTRIBUTION REQUEST.—The Finance Committee has asked the Electricity Committee to make a contribution of £2,579 towards the rates.

Sunderland.—STREET LIGHTING.—The Town Council is to provide another 500 "star-lighting" lamps in the main streets of the town.

York.—MODEL KITCHEN.—The Housing Committee proposes to erect a model kitchen in the Guildhall and is seeking the co-operation of the Electricity Committee and others interested.

SUPPLY TO FARM.—The Electricity Committee has obtained a Fringe Order for a supply to Ornhams Park Farm.

Overseas

Eire.—FURTHER RESTRICTIONS.—On March 14th a cut of 50 per cent. in the consumption of electricity for water heating was enforced, together with a reduction of 25 per cent. in supplies for all other purposes except cooking

motive power, traction and public lighting. The continuation of the crisis in the supply situation has now compelled the Electricity Supply Board to introduce new restrictions as from April 1st. Motive power consumption is cut by 10 per cent., traction by 33⅓ per cent., cooking by 15 per cent. and all other supplies except public lighting by 50 per cent. As regards the public lighting the enforcement of further economy is left to the discretion of the public authorities concerned. These reductions are to be made on the consumption for the corresponding period of 1941—that is, on the figures furnished to consumers on their ration cards. The penalty for non-compliance with the new regulations is disconnection of supply.

The E.S.B. expresses its appreciation of the excellent response of the public to its recent requests for economy, but regrets that "the continued disimprovement in conditions of supply renders the very latest restrictions unavoidable."

China.—CHUNGKING POWER PLANT.—A new power plant which will supply power to factories in an industrial district in Chungking's suburbs was inaugurated last week by the Minister of Economic Affairs. In a short speech the Minister said that the plant, though small was of great importance in China's ever-expanding reconstruction programme.—*Reuter.*

Germany.—RESTRICTION RELAXED.—The Reich Electricity Board is reported to have restored the 10 per cent. reduction in electricity consumption imposed on small industrial firms on December 6th. The 30 per cent. reduction in the case of shops, offices and hotels, remains.

TRANSPORT

Eire.—DUBLIN TRAM "CURFEW."—To reduce electricity consumption the Dublin United Transport Co. has decided to extend the 9.30 p.m. "curfew" at present applied to buses to the city trams. The services will also be less frequent outside peak hours and on Sundays.

Great Britain.—RAILWAYS AND SMOKE ABATEMENT.—On April 5th in the House of Commons Mr. Driberg asked the Parliamentary Secretary to the Ministry of War Transport, if, in planning the post-war reorganisation and development of the British railways, he would bear in mind the practice in force in New York City, where all trains were transferred in the outer suburbs from steam to electric traction, thus abating the smoke nuisance within the city. Mr. Noel-Baker replied that he would.

RADIO & TELEPHONY

Great Britain.—B.B.C. SURVEY.—Writing in the "B.B.C. Year Book, 1944" (2s. 6d.) published this week Mr. H. Bishop, chief engineer, states that the corporation had only eight short-wave transmitters in operation in September, 1939; in December, 1943, there were 34. Medium and long-waves radiating the European services had increased from one medium wave in 1939 to three medium and one long-wave in 1943.

Reference is made in the Year Book to post-war developments in broadcasting and television. One of the first aims will be to restore independent programmes from stations in Scotland, Wales, Northern Ireland and the broadcasting regions of England. These stations are in working order. Another plan is a regular service of exchange programmes between Great Britain and other countries. War research has brought television within reach of the great mass of the British public and the technical arrangements for a national service are now being examined. A Government committee under Lord Hankey is now considering whether the B.B.C.'s charter should be renewed in 1946 and whether advertising programmes should be introduced after the war.

Institution Notes

Centre Sectional Meetings

MR. H. COOPER (chairman), in a letter to members of the Western Centre of the I.E.E., refers to the proposal that Local Centres should hold meetings for the four separate Sections of the Institution. One reason for this is that in many cases when papers come before any of the Sections in London, the discussion cannot be completed because of time. Should these papers be discussed in the Centres by groups of each Section, the contributions can be sent forward to headquarters. The quality of the contributions is said to be more important than having large numbers at the meetings. Mr. Cooper asks members to indicate any of the four Sections in which they are interested, and whether they would support such meetings.

Cardiff Students

As a good response was received from those interested in the Cardiff area, it has been decided to go ahead with the foundation of a Cardiff Students' Section of the Institution of Electrical Engineers and the necessary application for permission to establish the Section is being applied for.

Devon and Cornwall Sub-Centre

We are informed by the secretary of the Devon and Cornwall Sub-Centre of the Institution that the meeting which was arranged for April 27th at Plymouth has been cancelled.

Scottish Centre

The Committee of the Scottish Centre in its forty-fourth annual report, states that membership of the Centre has increased from 1,073 to 1,179, and the average attendance at the meetings so far held has been 63, compared with 57 last session. With regard to the scheme approved by the Council for the attendance of non-members, it is reported that there have been fewer applications than anticipated, but it is hoped that greater advantage will be taken of the facility when it becomes more widely known.

Reference is made to the inestimable service which the Benevolent Fund is rendering to distressed and invalid members and dependants in the Centre's own area. About a third of the members contribute to the Fund, and more are taking advantage of the deed of covenant whereby subscriptions for seven years are, in effect, doubled in value to the Fund.

Col. H. Carter, B.Sc., T.D., has been elected chairman of the Centre for 1944-45 and Messrs. R. I. Kinnear and P. Philip vice-chairmen, all having been nominated by the Committee.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

British Insulated Cables, Ltd.—The trading profits for the year ended December 31st last show a slight reduction—£1,130,253 as compared with £1,149,031 for 1942. After meeting depreciation £256,626 (£257,382), directors' fees and bonus £11,662 (£12,833) and directors' works committee remuneration of £3,671 (£3,712), there remains a net profit of £858,294 (£875,104). Income tax provision takes £566,482 (£541,937) and preference dividends and a 5 per cent. interim dividend on the ordinary stock require £79,555 (£81,612). A sum of £100,000 is transferred to war contingencies reserve account and payment of a final dividend of 10 per cent. and a cash bonus of 5 per cent. on the ordinary stock absorbs £150,000 (£151,875), leaving £390,484 (£428,227) to be carried forward. In 1942 £50,000 was transferred to the provident fund for the workpeople.

Sir Alexander Roger

In a statement accompanying the report Sir Alexander Roger (chairman) says that it would be well if the public were able to give some thought to the immensity of the task which would have to be undertaken in changing over from war to peace. From 18 to 19 million men and women were employed in 1938: to-day at least half our male and female population are engaged in the services or in war work. Britain's gigantic industrial machine is harnessed to war with an annual production of several thousand million pounds. When peace comes this vast war production will gradually cease and the gap must be filled by the production of civilian needs if we are to reach full employment successfully. It is probably easier to convert from peace to war than from war to peace, and it will take years before we are completely turned over to peacetime occupations.

A big problem is involved in post-war imports and exports. In 1938 imports were over £900 million and if peacetime volume of home and export production is recovered, let alone expanded, imports will be required at least to the same value. But in 1938 we had some £200 million coming in from investments overseas, plus £120 million from shipping and other services, and this income, together with that derived from our ordinary export trade, was available to pay for imports, and will take some time to build up again. Some anxiety has been expressed because the Dominions have been rapidly industrialising, but this need not necessarily mean a falling off in British trade. The standard of living in many countries can and must be raised, and this in turn will increase their purchasing power and increase the demands for goods which Britain and other industrial nations can supply. The reconstruction of Europe is more vital to this country than to any other and we ought to share in satisfying what is likely to be a great market for capital goods and ultimately for consumption goods. There is also real ground for hope that economic collaboration will come about on a mutually satisfactory basis between the United States, Britain, Russia and China. Competition for world markets will be keen, but the modernisation of plant and machinery has put Britain in a better competitive position than before the war.

Lancashire Dynamo & Crypto, Ltd.—At the company's annual meeting last week Mr. A. E. L. Chorlton, C.B.E., M.P. (chairman), said that the results for the year were a record in turnover and profit, the latter being £127,255. An allocation of £3,000 has been made to the staff pension fund and a special allocation of £10,000 to the staff superannuation fund. During the past year all the company's works have been fully occupied and the total output had exceeded that of the previous year, which in itself had been a record for the company. A large volume of orders had been executed for exports to Russia and for war requirements throughout the Empire. He considered that the year's results could be regarded as a fine achievement.

The chairman referred to the fact that during the year the company had acquired a substantial interest in the Nevelin Electric Co., Ltd., manufacturers of mercury arc rectifiers.

Pinchin, Johnson & Co., Ltd., are raising their ordinary dividend for the past year from 8½ to 10 per cent. by a final payment of 7½ per cent. (against 6 per cent.). The net profit rose by £100,637 to £553,758, but this increase is practically all absorbed by higher taxation. The reserve for contingencies again receives £60,000.

Switchgear & Cowans, Ltd., report a profit of £22,653 for the past year, against £19,150 for 1942, after providing for taxation. The dividend is maintained at 20 per cent., and the allocation to general reserve is raised from £5,000 to £9,000, leaving £12,084 (against £10,431) to be carried forward.

Telegraph Construction & Maintenance Co., Ltd.—After meeting taxation, the net profit for 1943 was £51,488, as compared with £49,365 for 1942. The final dividend of 5 per cent. again makes 10 per cent. for the year.

The Electric Supply Corporation Ltd., is paying a final dividend of 6½ per cent., making 10 per cent. (same). After providing for taxation the net profit for 1943 was £58,818 (against £57,842), leaving £37,860 (£37,168) to be carried forward.

Davis & Timmins, Ltd., are to pay a final dividend of 20 per cent., again making 30 per cent. for the year. The net profit, after providing for taxation, war damage contribution, etc., was £50,733 as compared with £50,540 for 1942.

The Gateshead & District Tramways Co., Ltd., reports a net profit for 1943 of £22,795, compared with £24,143 in the preceding year. To this is added £44,562 brought forward, making

£67,357. The ordinary dividend for the year is maintained at 10 per cent. and £45,389 is carried forward.

The Ever Ready Trust, Ltd., is raising the final dividend on its ordinary and deferred shares from 6 to 7 per cent., making 10 per cent. for the past year (against 9 per cent.).

Worthington-Simpson, Ltd., are again paying a dividend of 7 per cent. on the ordinary shares. The profit for the past year, after meeting taxation, was £21,106, as compared with £20,607 for 1942.

The Burma Electric Supply Co., Ltd., reports a revenue for the year ended July 31st, 1943, of £4,685. Expenses absorbed £3,180, leaving £1,505 to be carried forward.

The Renold & Coventry Chain Co., Ltd., is to pay an interim dividend of 3 per cent. (same).

Heatrae, Ltd., is paying a first and final dividend of 12½ per cent. (same).

New Companies

Lindum Electrical Repair Co., Ltd.—Private company. Registered March 29th. Capital, £3,000. Objects: To carry on the business of motor and general electrical engineers, lighting specialists, wireless and television engineers and service agents, etc. Directors: A. Peniston, Beaumont Court, Spring Hill; W. A. Snowden, 9, Western Crescent; and W. J. Bell, 40, Boultham Avenue, all Lincoln. Registered office: Boultham Engineering Works, Waterloo Street, Lincoln.

Barries Electrical Agencies, Ltd.—Private company. Registered April 1st. Capital, £2,500. Objects: To carry on the business of merchants, commission agents, importers, exporters and manufacturers of, and dealers in, wireless and television goods and instruments, electrical engineering goods, etc. Directors: D. G. E. Barrie and Jessie V. A. Barrie, both of 48, Hogarth Road, Hove, 3. Registered office: 50, King Street, Brighton.

Companies' Returns

Statements of Capital

British Brown-Boveri, Ltd.—Capital, £50,000 in £5 shares. Return dated December 15th. All shares taken up. £21,250 paid (£2 10s. on 8,500 shares). £7,500 considered as paid (£5 on 1,500 shares). Mortgages and charges: Nil.

Young Accumulator Co., Ltd.—Capital, £225,000 in 2s. shares. Return dated November 12th. 1,934,800 shares taken up and fully paid up. Mortgages and charges: Nil.

C. O. Pudney & Co., Ltd.—Capital, £6,000 in £1 shares. Return dated February 2nd. All shares taken up. £3,560 paid. £2,440 considered as paid. Mortgages and charges: Nil.

Hanovia, Ltd.—Capital, £25,000 in £1 shares. Return dated January 12th. All shares taken up. £20,500 paid. £4,500 considered as paid. Mortgages and charges: Nil.

Jeary Electrical Co., Ltd.—Capital, £15,000 in 12,000 preference and 3,000 ordinary shares of £1. Return dated November 27th, 1942 (filed March 11th, 1944). 7,000 preference and 3,000 ordinary shares taken up. £7,000 paid on the preference. £3,000 considered as paid on the ordinary shares. Mortgages and charges: Nil.

Coiled Coil Lamps, Ltd.—Capital, £100 in £1 shares. Return dated January 14th. 2 shares taken up. £2 paid. Mortgages and charges: Nil.

Mortgages and Charges

Exchange Battery Service, Ltd.—Debenture dated March 25th, 1944, to secure all moneys due or to become due from the company to the chargees (Associated Distributors, Ltd., Nottingham), charged on the company's undertaking and property, present and future, including uncalled capital.

Besst Electrics, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated March 20th, to secure £2,500. Holders: Bentinck, Ltd., Lloyds Bank Buildings, King Street, Manchester.

Super Lighting Fittings, Ltd.—Particulars filed of debentures for not more than £1,150, authorised December 31st, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £1,150 on March 9th.

Electrical Measuring Instruments Co., Ltd.—Particulars filed of £4,000 debentures, authorised January 17th, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Central Radio (Eastbourne), Ltd.—Satisfaction in full on March 13th, of (a) series of debentures for £750, registered October 8th, 1925; and (b) series of second debentures for £300, registered August 7th, 1926.

Park Bros., Ltd.—Mortgage on Brunswick Mill, Canterbury Street, Blackburn, with fixtures, etc., dated March 22nd, to secure all moneys due or to become due from the company to Westminster Bank, Ltd.

Schall & Son, Ltd.—Assignment of proceeds of contracts, dated March 14th, to secure all moneys due or to become due from the company to Midland Bank, Ltd.

Winding-up Petition

Princely Battery Co., Ltd.—A petition for the winding-up of this company has been presented by a creditor and will be heard at the Royal Courts of Justice, London, on April 24th. Notification of intention to appear must be sent to Shepheard & Co., 1, Arundel Street, Strand, W.C.2, by April 22nd.

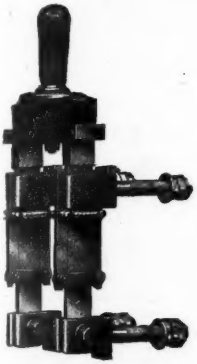
Liquidations

Kye Electrical, Ltd.—Winding-up voluntarily. Liquidator, Mr. H. P. Goodall, Electra House, London, W.C.2.

Bankruptcies

R. Jackson, electrician, residing at 5, Romney Avenue, Dalton-in-Furness, and lately carrying on business at 38, Whalley Range, Blackburn, Lancs.—Last day for receiving proofs April 24th. Trustee, W. G. Pearson, 16, Cornwallis Street, Barrow-in-Furness.

SWITCH *and* FUSEGEAR



A complete range of Switch and Fusegear for switchboard mounting is available

FROM STOCK

The Verity range comprises
Switches—15 to 1,000 amps
Fuses — 15 to 1,000 amps

VERITYS LTD., ASTON, BIRMINGHAM 6
Sales Headquarters : **BRETTENHAM HOUSE, LANCASTER PLACE, W.C.2**

Maintenance more important than ever before !

MAKE REGULAR USE OF . . .

MARTINDALE COMMSTONES

● Cut copper, brass and steel without clogging. Edges of every bar left clean ; no dragging of copper. Save 75% of time and cost of turning commutator in lathe. Give longer life to motors, etc.

Over 50 sizes in stock, in 3 grades: coarse, medium and fine. 20 different types of handle.
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Insulated Wires & Cables

for ALL ELECTRICAL PURPOSES

THERMOPLASTIC INSULATION (P.V.C.)

"POLYKOL" is our registered title and trade mark for a plasticised Polyvinyl chloride, which material is recognised by B.S.I. and authorised by Ministry of Supply Cable Planning Organisation.

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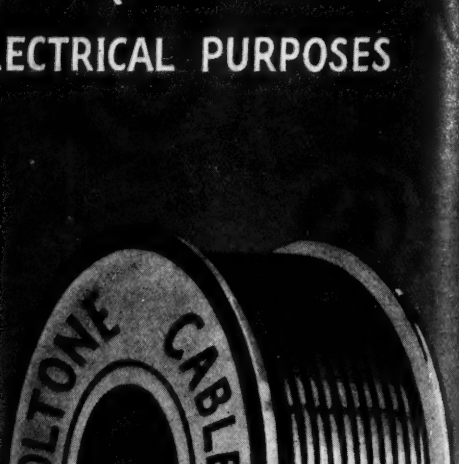

Made to a Standard

WARD & GOLDSTONE LTD. PENDLETON, MANCHESTER. 6.

ESTABLISHED OVER HALF A CENTURY

STOCKS AND SHARES

TUESDAY EVENING.

STOCK EXCHANGE markets returned to business, after the Easter holidays, in the expectation that the aftermath of "Salute the Soldier" week will continue for a time to curtail business in the purely investment markets. With similar weeks starting in various parts of the country, the general effect will be felt for another three or four months, though, of course, to a minor extent. Some of the markets attract a somewhat surprising amount of speculative interest. Notwithstanding the really colossal amount of money raised by the Salutations to the Soldier, Stock Exchange evidence shows that there is still a good deal of capital available for employment in a number of other directions.

Transport "C"

The Stock Exchange official quotation for London Passenger Transport "C" stock is 69 to 73, but this is misleading, because there are buyers in the market at 71, if not at a better price. Should it be considered desirable to quote such a needlessly wide margin as four points between selling and buying, the price more accurately stated would be 70 to 74. The stock continues to be consistently absorbed. Buyers look to the time after the war when Transport "C" stock will conceivably earn, and receive, its standard 5½ per cent. dividend, improbable as this appears to be at the present time.

The price is maintained by the hope of what is going to happen after the war. A further element of strength was furnished by the recent Thomas Tilling report, which, as pointed out here on March 3rd, took its large holding of Transport "C" stock into account at 80.

For reasons somewhat akin to those which stimulate the buying of Transport "C" stock, Tilling ordinary shares have again been in demand. The price is 1s. better at 59s. Nor is British Electric Traction neglected. The deferred is 5 points higher at 1135. Bristol Trams moved up to 55s. 6d. A little selling made West Ridings 6d. easier at 44s. 6d.

Price Fluctuations

The changes in prices amongst equipment and manufacturing shares are limited to about a baker's dozen. De la Rue are a good market at 85s. 8d. Reyrolles have attained £2, gaining 1s. 6d. and a jump of 2s. 9d. in Hopkinsons took the price to 66s. 6d. Hall Telephones at 28s. and Westinghouse Brake at 72s. are both 1s. up. Henley's have put on 3d. at 26s. 9d. and at 73s. Johnson & Phillips retain their last week's improvement. International Combustions advanced to 6¼. Ensign Lamps at 21s. 3d. lost part of their recent strength. British Aluminium and British Thermostat show gains of 6d.

Switchgear & Cowans, the electrical engineers, repeat their dividend of 20 per cent. for the full year and the profit of £22,600 is about £3,500 up. The price of the shares remains unchanged at 18s. 6d.

Amongst overseas issues, Brazilian Tractions reacted to 27¾, Victoria Falls Power ordinary fell ⅛ to 83s. 9d. and Calcutta Trams 1s. to 38s. Canadian utilities are a rather better market: Shawinigan Power shares at 17 are ¼ higher, but Montreal Light & Power remain dull at 22.

Electricity Supply

Due mainly to the coal strikes and their aftermath, the supply of electricity to industry is to be reduced by 10 per cent. The cut in gas supplies is 25 per cent. The markets in both classes of shares, electricity and gas, received the intimation with indifference. If anything, the prices of shares improved to a slight extent; an ironical sequel to the Government Order. In the electricity supply section, the general tendency of prices is upwards, although this is hardly noticeable in consequence of the steadiness of quotations. It is only when one comes to buy shares that the inherent strength of the market becomes obvious.

The argument is heard in the Stock Exchange market that the 10 per cent. cut will make little difference to the companies. In present circumstances they can sell all they can produce. The effect upon profits and earnings is considered likely to be negligible. No shares have come to market and, in spite of the increasing difficulties with which the industry is faced, the confidence of shareholders is sufficiently strong for the market to remain one of the firmest in the industrial groups.

British Insulated

British Insulated Cables holds its meeting on Thursday next week and the statement of the chairman, Sir Alexander Roger, circulated with the report and accounts, points out that peace is going to be vastly complicated to arrange, and will require sagacity and courage of the highest order. The company's turnover in 1943 was as high as that in 1942 but heavier costs resulted in a reduced rate of profit. The net profit of £291,812 is about £41,000 down as compared with 1942; the dividend and bonus are again 20 per cent. for the year.

Radio Shares

Activity in shipping, oil and mining shares has not prevented the radio group from receiving renewed favourable attention.

(*Continued on page* 539)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Apr. 11	Rise or Fall	Yield £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	61/–	..	4 2 0
British Power and Light	7	7	33/–	..	4 4 10
City of London	7	5½	27/6	..	4 0 0
Clyde Valley	8	8	41/6	..	3 17 0
County of London	8	8	40/–	..	4 0 0
Edmundsons:					
7% Pref.	7	7	34/6	..	4 1 4
Ord.	6	6	29/–	..	4 2 9
Elec.Dis.Yorkshire	9	9	44/6	..	4 1 0
Elec. Fin. and Securities	12½	12½	55/–	..	4 11 0
Elec. Supply Corporation	10	10	47/–	..	4 5 0
Isle of Thanet	Nil	Nil	18/–	..	—
Lancs. Light and Power	7½	7½	36/–	..	4 3 4
Llanelly Elec.	6	6	26/–	..	4 12 4
Lond.Assoc.Electric	3	4	23/–	..	3 9 7
London Electric	6	6	28/–	..	4 5 9
LondonPowerRed. Deb.	5	5	103½	..	4 14 7
Metropolitan E.S.	8	8	40/–	–6d.	4 0 0
Midland Counties	8	8	40/6	..	3 19 0
Mid. Elec. Power	9	9	45/–	..	4 0 0
Newcastle Elec.	7	7	30/6	..	4 12 0
North Eastern Elec.:					
Ordinary	7	7	33/6	..	4 3 7
7% Pref.	7	7	35/–	..	4 0 0
Northampton	10	10	48/–	..	4 3 4
Notting Hill 6% Pref. (£10)	6	Nil	11	..	—
Northmet Power:					
Ordinary	7	7	38/–	..	3 13 9
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	25/6	..	4 14 1
Scottish Power	8	8	40/–	..	4 0 0
Southern Areas	5	5	23/–	..	4 7 0
South London	7	7	28/–	..	5 0 0
West Devon	5	5	23/6	..	4 5 0
West Glos.	4½	3½	23/6	..	2 19 7
Yorkshire Elec.	8	8	43/–	..	3 14 5
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	6/3	..	—
Calcutta Elec.	7*	6*	37/–	..	3 4 10
Cawnpore Elec...	10	10	35/–	..	5 14 3
East African Power	7	7	33/–	..	4 4 10
Jerusalem Elec...	7	5	28/6	..	3 10 2
Kalgoorlie (10/–)	5	5	10/–	..	5 0 0
Madras Elec.	4*	Nil	23/–	..	—
Montreal Power	1½	1½	22	..	6 16 4
Palestine Elec."A"	4*	5*	40/6	..	2 9 5
Perak Hydro-elec.	6	7	10/–	..	—
Shawinigan Power	83cts.	90cts.	17	+½	—
Tokyo Elec. 6%	6	6	18	..	—
VictoriaFallsPower	15	15	4⅛	–⅛	3 11 7
Whitehall Inv.Pref.	—	6	23/6	..	5 2 2

Company	Dividend Previous	Dividend Last	Middle Price Apr. 11	Rise or Fall	Yield £ s. d.
Public Boards					
Central Electricity:					
1955–60 (Civil Defence)	—	2	100	..	3 0 0
1955–75	5	5	114	..	4 7 9
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	104	..	3 7 4
1974–94	3½	3½	106xd	..	3 5 0
London Elec. Trans. Ltd.	2½	2½	97	..	2 11 3
London & Home Counties1955–75	4½	4½	113	..	3 19 8
Lond.Pass.Trans.:					
A	4½	4½	121½	..	3 14 1
B	5	5	119½	..	4 3 8
C	3	3½	71	+1	4 11 7
WestMidlandsJ.E.A. 1948–68	5	5	108½	..	4 12 4
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	117½	..	5 2 2
Def.	1½	1½	29	..	5 3 5
Anglo-Portuguese	8	8	24/–	..	6 13 4
Cable & Wireless:					
5½ Pref.	5½	5½	115	..	4 15 8
Ord.	4	4	81½	..	4 18 2
CanadianMarconi$1	Nil	4cts.	9/9	..	—
Globe Tel. & Tel.:					
Ord.	8½*	5*	37/6xd	..	2 13 4
Pref.	6	6	30/ xd	+6d.	4 0 0
Great Northern Tel. (£10)	Nil	Nil	21½	..	—
Inter. Tel. & Tel.	Nil	Nil	16½	..	—
Marconi-Marine	7½	7½	33/–	..	4 11 0
Oriental Tel. Ord.	16	10	44/–	..	—
Telephone Props.	6	Nil	16/–	..	—
Tele.Rentals(5/–)	10	10	11/6	..	4 7 0
Traction and Transport					
Anglo-Arg.Trans.:					
First Pref. (£5)	Nil	Nil	2/6	..	—
4% Inc.	Nil	Nil	7	..	—
Brit.Elec.Traction:					
Def. Ord.	45	45	1135	+5	3 19 4
Pref. Ord.	8	8	175	..	4 11 5
Bristol Trams	10	10	55/6	+3d.	3 12 2
Brazil Traction	$1	$1⅓	27¾	–⅜	6 6 2
Calcutta Trams	5½	6½	38/–	–1/–	3 8 6
Cape Elec. Trams	5	6	26/–	..	4 12 4
Lancs. Transport	10	10	45/6	..	4 8 0
Mexican Light:					
1st Bonds	5	5	101½	..	4 18 7
Rio 5% Bonds	5	5	105½xd	..	4 14 9
Southern Rly.:					
5% Prefd.	5	5	76	..	6 11 9
5% Pref.	5	5	114	–½	4 7 9
T. Tilling	10	10	59/–	+1/–	3 8 0
West Riding	10	10	44/6	–6d.	4 10 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Apr. 11	Rise or Fall	Yield p.c.
Equipment and Manufacturing					£ s. d.
Aron.Elec.Ord. ..	10	15	57/6	..	5 4 4
Assoc. Elec. :					
Ord.	10	10	51/6	..	3 17 8
Pref.	8	8	39/6	..	4 1 0
AutomaticTel.&Tel.	12½	12½	60/6xd	..	4 2 8
Babcock & Wilcox	11	11	50/–	..	4 8 0
British Aluminium	10	10	47/6	+6d.	4 4 1
British Insul. Ord.	20	20	5½½	..	3 14 4
British Thermostat (5/–)	18½	18½	19/6	+6d.	4 14 10
British Vac. Cleaner (5/–)	15	30	28/6	..	5 5 1
Brush Ord. (5/–)	6	8	9/–	..	4 9 0
Burco (5/–) ..	15	17½	15/6	..	5 13 0
Callender's ..	15	20	5½	..	3 18 0
ChlorideElec.Storage	15	15	80/–	..	3 15 0
Cole, E. K. (5/–)	10	15	26/6	+3d.	2 16 7
Consolidated Signal	24	27½	6	..	4 11 6
Cossor, A. C. (5/–)	7½*	10*	24/9	+9d.	1 0 3
Crabtree (10/–) ..	17½	17½	38/3	..	4 11 5
Crompton Parkinson Ord. (5/–) ..	20	22½	29/–	..	3 17 7
E.M.I. (10/–) ..	6	8	29/6	..	2 4 2
Elec.Construction	10	12½	52/–	..	4 16 2
Enfield Cable Ord.	12½	12½	59/6	..	4 4 0
English Electric .	10	10	50/–	..	4 0 0
EnsignLamps(5/–)	25	15	21/3	–½	3 10 8
Ericsson Tel. (5/–)	22*	20*	52/9	..	1 18 0
Ever Ready (5/–)	40	40	39/–	..	5 2 7
Falk Stadelmann	7½	7½	33/6	..	4 9 7
Ferranti Pref. ..	7	7	30/–	..	4 13 4
G.E.C. :					
Pref.	6½	6½	34/–	..	3 16 6
Ord.	17½	17½	91/6	–6d.	3 16 5
General Cable (5/–)	15	15	15/–	..	5 0 0
Greenwood & Batley	15	15	41/3	..	7 5 9
HallTelephone(10/–)	12½	12½	28/–	+1/–	4 9 3
Henley's (5/–) ..	20	20	26/9	+3d.	3 14 9
4½% Pref. ..	4½	4½	24/–	..	3 15 0
Hopkinsons ..	15	17½	66/6	+2/9	5 5 1
India Rubber Pref.	5½	5½	22/–	..	5 0 0
Intl. Combustion	30	30	6½	+½	4 16 0
Johnson & Phillips	15	15	73/–	..	4 2 2
LancashireDynamo	22½	22½	92/–	..	4 17 10
Laurence,Scott(5/–)	12½	12½	13/–	..	4 16 2
London Elec. Wire	7½	7½	36/6	..	4 2 3
Mather & Platt .	10	10	53/3	–½	3 15 5
Metal Industries (B)	5	8	47/6	..	3 7 6
Met.Elec.CablePref.	5½	5½	21/3	..	5 3 6
Murex	20	20	103/3	..	3 17 6
Pye Deferred (5/–)	25	25	26/3	..	4 15 3
Revo (10/–) ..	17½	17½	40/–	+1/6	4 7 6
Reyrolle ..	12½	12½	68/9	..	3 12 8
Siemens Ord. ..	7½	7½	33/–	..	4 11 0
Strand Elec. (5/–)	7½	10	7/9	..	6 9 0
Switchgear & Cowans (5/–) ..	10	20	18/6	..	5 8 1
T.C.C. (10/–) ..	5	7½	20/–	..	3 15 0
T.C. & M. ..	10	10	50/6	..	3 19 3
Telephone Mfg. (5/–)	9	9	10/9	–3d.	4 3 10
Thorn Elec. (5/–)	20	20	23/3	+3d.	4 6 0
Tube Investments	20	20	96/6	..	4 3 0
Vactric (5/–) ..	Nil	Nil	14/9	..	—
Veritys (5/–) ..	7½	7½	7/9	..	4 16 9
WalsallConduits(4/–)	55	55	47/6	..	4 13 7
Ward & Goldstone (5/–)	20	20	26/6	..	3 15 6
WestinghouseBrake	12½	14	72/3	+1/–	3 17 6
West, Allen (5/–)	7½	7½	7/3	..	5 3 5

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 537)

Cossor shares proved the most popular in their section. The price followed up last month's advance with a further rise to 24s. 9d. at which the yield on the money is no more than the equivalent of 2 per cent gross, taking tax at 10s. in the £. Philco kept good at 12s. 9d. E.M.I. held steadily to 29s. 6d., Pye deferred to 29s. 6d.; E. K. Cole, at 26s. 6d., gained a few pence.

Metal Industries

Last month, the price of Metal Industries "B" shares, under considerable purchasing pressure, advanced to 47s. 6d. The company holds £924,000 ordinary stock in the British Oxygen Co., Ltd., and 92 per cent. of the ordinary shares of Electrical Switchgear & Associated Manufacturers, Ltd. Other interests have also been acquired from time to time, and the issued capital of the company is now £2,650,000. Last year's dividend of 7½ per cent. was raised from 5 per cent. paid annually in four previous years. The price of the shares went down to 12s. 6d. soon after the outbreak of war; the present quotation is the highest since 1937. The yield is extremely modest, but Metal Industries is one of the companies the shares in which are expected to increase materially in value as soon as industry gets going after the war. The issued capital is divided into 1,900,000 units of £1 "B" ordinary stock, £250,000 "A" ordinary stock and half a million pounds 5½ per cent. cumulative preference.

Electric Supply Corporation

Electric Supply Corporation shares are unchanged at 47s. on the final dividend of 6½ per cent. making 10 per cent. for the year, a rate which has been paid since 1940. Previously, the company had paid 12 per cent. for 1937 and 1938, and 11½ per cent. for 1939. The year ends with December, and for 1942 the ordinary dividend was barely earned. The company occupies a sound financial position, however, and the ordinary shares are regarded as a good investment. The company owns or is associated with various electricity supply undertakings, all of which are purchaseable by local authorities on certain terms and conditions.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

W. H. ALLAN.—" Moving-coil loud-speakers and microphones and like electro-acoustic apparatus." 6964. May 4th, 1943. (560219.)

Automatic Telephone & Electric Co., Ltd., R. Taylor and G. T. Baker.—" Telephone systems." 13098. September 17th, 1942. (560120.) " Telephone systems." 20779/43. September 17th, 1942. (Divided out of 560120.) (560132.)

British Thomson-Houston Co., Ltd.—" Manufacture of insulators of ceramic material." 8011/42. June 16th, 1941. (560171.) " Pressure switch mechanism." 13445/42. September 26th, 1941. (560206.) " Electric discharge lamps." Cognate applications 14531/42 and 14532/42. October 18th, 1941. (560244.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Volt-ampere meters." 14705. October 20th, 1942. (560246.)

British Thomson-Houston Co., Ltd., and A. F. Harvey.—" Electric motor control systems." 10765. July 31st, 1942. (560198.)

Budd Induction Heating, Inc.—" Apparatus for heating billets or other workpieces." 13531/42. September 19th, 1941. (560188.) " Electric induction heating apparatus." 13676/42. October 18th, 1941. (560189.)

C. R. Burch and Metropolitan-Vickers Electrical Co., Ltd.—" Lenses." 13228. September 18th, 1942. (560162.)

C.A.V., Ltd., and T. Curzon.—" Apparatus for detecting faults in the armatures of dynamo-electric machines." 13136. September 17th, 1942. (560124.)

C.A.V., Ltd., and S. F. H. Parsons.—" Electric engine-starting motors." 13137. September 17th, 1942. (560125.)

General Electric Co., Ltd., R. L. Breadner, J. W. Harris and C. H. Simms.—" Manufacture of seals wherein electric conductors pass through a vitreous wall." Cognate applications 13410/42 and 7554/43. September 23rd, 1942. (560237.)

W. W. Gleave and Imperial Chemical Industries, Ltd.—" Electrolytic processes." 13385. September 23rd, 1942. (560235.)

M. C. Harley.—" Electric lamps." 11350. August 13th, 1942. (560152.)

H. M. Harmer.—" Means for producing alternating current of constant voltage and frequency, from variable-speed generating means." 13270. September 21st, 1942. (560180.) " Vibrating relay systems for developing alternating current from a direct current source." 13290. September 21st, 1942. (560181.)

G. Kent, Ltd.—" Glass cell electrodes and measuring apparatus for use therewith." 14091/42. February 21st, 1942. (560212.)

Marconi's Wireless Telegraph Co., Ltd.—" Optical systems." 10174/42. July 1st, 1941. (560150.)

Mullard Radio Valve Co., Ltd., and R. G. Clark.—" Variable inductances." 13404. September 23rd, 1942. (560236.)

Mullard Radio Valve Co., Ltd., and R. A. Stephen.—" Getters for electron-discharge tubes." 11688. August 19th, 1942. (560155.)

J. F. O'Brien.—" Electricity conductor unit." 9071/42. July 25th, 1941. (560146.)

Okonite-Callender Cable Co., Inc.—" Electric power cable systems." 13803/42. September 19th, 1941. (560209.)

Patehold Patentverwertungs & Electro-holding Akt.-Ges.—" Transmitting tubes." 7126/41. May 23rd, 1941. (560140.)

A. Reyrolle and A. Felce.—" Time-lag or delay-action devices." 10735. July 31st, 1942. (560113.)

B. D. Scott.—" Radio and television receivers." 11483. August 17th, 1942. (560153.)

Standard Telephones & Cables, Ltd.—" Thermo-sensitive electric relay." 13171/42. September 24th, 1941. (560158.)

Standard Telephones & Cables, Ltd., and R. Kelly.—" Power supply systems for carrier communication systems." 11057. August 7th, 1942. (560230.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea, L. W. Houghton, C. T. Scully and D. M. Ambrose.—" Electric signal transmission circuits." 13121. September 17th, 1942. (560122.)

A. N. Stevens (Yoder Co.).—" Welding apparatus." 7488. June 2nd, 1942. (560141.)

Switchgear & Cowans, Ltd., and A. Upton.—" Electric switchgear structures." 5827. April 12th, 1943. (560217.)

United Wire Works (Birmingham), Ltd., and J. Needham and C. A. Lowndes (both legal representatives of H. Lowndes).—" Method of and machine for coiling metal wire and strip." 9875. July 16th, 1942. (560111.)

Westinghouse Brake & Signal Co., Ltd., N. G. Cadman and R. M. MacGregor.—" Retardation or acceleration controllers." 13216. September 18th, 1942. (560161.)

Wico Electric Co.—" Magnetos." 8496/42. October 31st, 1941. (560110.)

TRADE MARK APPLICATIONS

THE following applications have been made for British trade marks. Objections may be entered within a month from April 5th:—

MERITUS (design). No. 626,703, Class 7. Electric welding machines. No. 626,704, Class 11. Electric lighting installations and electric lighting fittings.—Meritus (Barnet), Ltd., 36 Wood Street, Barnet, Herts.

GLOBE (design). No. 624,178, Class 9. Dry batteries.—Brooks & Bohm (Dry Batteries), Ltd., 90 Victoria Street, Westminster, London, S.W.1.

MANICOR. No. 625,279, Class 9. Parts (not included in other classes) of scientific and electrical apparatus and instruments (including wireless) and of measuring and signalling apparatus and instruments, all being goods

made of common metal alloys.— Mallory Metallurgical Products, Ltd., 78, Hatton Garden, London, E.C.1.

REGENATROL and ECONOTROL. Nos. 625,868 and B625,869 respectively, Class 9.—Hewittic Electric Co., Ltd., Hersham Lodge, Hersham, Walton-on-Thames.

HETEX. No. 626,332, Class 9. Electric high-frequency oscillation generators and apparatus. —Standard Telephones & Cables, Ltd., Connaught House, 63, Aldwych, London, W.C.2.

PORTOMATIC, TRAVELETTE, LIBERATOR and FEDERAL. Nos. 626,413, 626,414, 626,416 and 626,417, respectively, Class 9. Radio receiving and transmitting apparatus and parts thereof not included in other classes; electric batteries, accumulators, switches, terminals and coils. SENTINEL. No. 626,415, Class 9. Radio receiving and transmitting apparatus.— Wizard Production Co., Ltd., Withy Grove, Manchester.

DUPAR (design. No. 626,408, Class 9. Electric switches.—Dewhurst & Partner, Ltd., Inverness Works, Inverness Road, Hounslow, Middlesex.

Forthcoming Events

Friday, April 14th. — *Manchester.* — At Engineers' Club, 6.30 p.m. Manchester Association of Engineers. Lecture on " Manufacture of Glass," by Mr. R. F. Taylor, B.Sc. (Pilkington Bros., Ltd.).

Saturday, April 15th.—*Leeds.*—Griffin Hotel, 2.30 p.m. I.E.E. North Midland Students' Section. " Diesel Electric Traction," by Mr. J. W. Biggs.

London.—Connaught Rooms, W.C.2, 1 for 1.30 p.m. Junior Institution of Engineers. Annual luncheon.

Monday, April 17th.—*London.*—Institution of Rubber Industry (London Section). Annual general meeting.

Birmingham.—Grand Hotel, 6 p.m. " Brains Trust." (This takes the place of the paper by Mr. T. G. Tanner previously announced.)

Liverpool.—At Royal Institution, Colquitt Street, 5.30 pm. I.E.E. Mersey and North Wales (Liverpool) Centre. Annual general meeting followed by short papers on " The Post Office Speaking Clock," by Mr. E. Blackburn, B.Sc.; " Development and Application of the Amplidyne," by Mr. O. I. Butler, M.Sc.; " Lightning and its Effect on Electrical Apparatus," by Mr. J. Durnford; and " Transmission Line Principles," by Mr. D. J. Pearce.

Bristol.—I.E.E. Western Centre. " Protective Systems for Rural Distribution up to 33 kV," by Messrs. R. W. Steel and A. W. Allwood, B.Sc.

Cambridge. — Cambridgeshire Technical School, 5.30 p.m. I.E.E. Cambridge and District Wireless Group. " Survey of the Problems of Post-War Television," by Mr. B. J. Edwards.

Newcastle-on-Tyne.—Royal Station Hotel. I.E.E. North-Eastern Centre. Annual general meeting and informal conversazione.

Derby.—School of Arts Lecture Theatre, Green Lane. Derby Society of Engineers. Ten-minute papers by members and annual general meeting.

Tuesday, April 18th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Wireless Section. Discussion on " Metals and their Finishes in Radio Construction," to be opened by Dr. G. L. Sutherland.

London.—Imperial College of Science and Technology, South Kensington, 5 p.m. Joint meeting of Illuminating Engineering Society and the Science Masters' Association. Demonstrations illustrating principles of illumination and photometry.

Manchester.—Engineers' Club, Albert Square, 6 p.m. Joint meeting of the I.E.E. North-Western Centre and the Institution of Post Office Electrical Engineers. " Merging of Line and Radio Techniques," by Mr. A. H. Mumford, B.Sc. (Eng.).

Wednesday, April 19th.—*Manchester.*—At Engineers' Club, Albert Square, 6.30 p.m. Women's Engineering Society. " Rubber in Engineering," by Dr. Naunton.

Thursday, April 20th.—*London.*—At Institution of Mechanical Engineers, Storey's Gate, S.W.1, 2.30 p.m. Institute of Fuel. " Organisation of a Research Department," by Dr. A. Parker, Director of Fuel Research.

London.—Waldorf Hotel, Aldwych, 6.30 p.m. London and District Section, Institute of the Plastics Industry. " Polyvinyl Chloride," by Mr. D. N. Davies.

Swansea.—Guildhall, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. Informal discussion on " Protection," to be opened by Mr. J. F. Wright.

Friday, April 21st.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Measurements Section. " New Type of Electron-Optical Voltmeter," by Dr. L. Jacob.

London.—39, Victoria Street, S.W.1, 6.15 p.m. Junior Institution of Engineers. Informal meeting. " Anomalies in Engineering," by Mr. A. J. Simpson.

Manchester.—At Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Centre Wireless Group. " Solution of Transmission Line Problems by the Use of the Circle Diagram of Impedance," by Prof. Willis Jackson and Dr. L. G. Huxley.

Sheffield.—At Metallurgical Club, West Street. 7 p.m. Junior Institution of Engineers, Sheffield Section. " Post-war Problems and Prospects," by Mr. C. Laycock.

Birmingham.—Imperial Hotel, 6 p.m. Illuminating Engineering Society, Birmingham Centre. Address by Dr. H. Buckley, president of the I.E.S.

Newcastle-on-Tyne.—Neville Hall, Westgate Road, 6.30 p.m. I.E.E. North-Eastern Students' Section. Annual general meeting and film night.

Bath.—Pump Room, 7.15 p.m. I.E.E. Bristol Students' Section. " Electrical Equipment of Merchant Ships," by Mr. N. T. Evans.

Saturday, April 22nd.—*Barnsley.*—Hagenbach's Café, 4.30 p.m. Association of Mining Electrical and Mechanical Engineers (Yorkshire North-West Branch). Annual general meeting and annual dinner.

Monday, April 24th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Informal meeting. Discussion on " Fuel and Mechanical Power," to be opened by Mr. J. F. Field, B.Sc.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Dumfries. — April 18th. Town Council. Erection of an electricity substation; R. S. Osborne, burgh surveyor; tenders to town clerk.

Midlothian.—County Council. Various works (including electrical) at housing scheme (20 houses) at Newton Grange. Schedules from county architect, 10, Drumsheugh Gardens, Edinburgh, 3.

Plymouth.—May 1st. Corporation Electricity Supply Department. Low-voltage underground network disconnecting boxes. (See this issue.)

West Midlands.—April 28th. Joint Electricity Authority. Automatic fire-fighting equipment. (March 31st.)

Orders Placed

Birkenhead.—Electricity Committee. Accepted. 250-kVA transformer.—English Electric Co. Lamps for twelve months: 33⅓ per cent. of the Electricity Department's requirements to be purchased from L. Andrew & Co., W. E. Beardsall & Co., Luxram Electric, and United Electric, and 66⅔ per cent. from the "Ring" firms included in the schedules.

Bradford.—Buildings Committee. Accepted. Repairs and renewals to seven lifts and hoists in Corporation premises (£855).—F. Ellison & Co.

Manchester.—Gas Committee. Accepted. Switchgear and cable for coal-handling plant.—Bertram Thomas & Co. Two duplicate motors for coal plant.—Lancashire Dynamo & Crypto.

Electricity Committee. Accepted. 33,000-V and 6,600-V switchgear.—British Thomson-Houston Co.; A. Reyrolle & Co.; Ferguson, Pailin.

Salford.—Education Committee. Recommended. Improvement of lighting of stage at Broughton school hall (£135).—Broughton & Irlam Electric Engineering Co.

Light, Heat and Power Committee. Recommended. Two electric capstans for Liverpool Street gas works (£542).—Babcock & Wilcox.

Worthing.—Electricity Committee. Accepted. Paper-insulated cable for twelve months.—Britannic Cable & Construction Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Birmingham.—Maternity home, Church Road, Perry Barr, and residential nursery, Perry Villa; city engineer.

Bournemouth.—Extensions, Southbourne nursery (£2,000); borough engineer.

Bradford.—Canteen, Great Horton school; city engineer.

Chadwell Heath.—Factory; Nelbarden Manufacturing Co.

Cheltenham. — Maternity accommodation, Longhill Hospital (electrical work); borough engineer.

Chester-le-Street.—Second miners' hostel at South Pelaw; Ministry of Works, St. Mary's Place, Newcastle-on-Tyne.

Durham.—School meals centre, Catchgate; F. Willey, 34, Old Elvet, Durham City.

Guildford.—Kitchen, Northmead school; borough engineer.

Jarrow-on-Tyne. — Bakery extensions and model dairy for the Jarrow and Hebburn Co-operative Society; G. C. Young, architect, 12, Grange Road West, Jarrow.

London.—Store for L.C.C. Supplies Dept., Pinkham Way, Friern Barnet; L.C.C. architect.

Mansfield.—Factory extension, Harrington Street; Mansfield Hosiery Mills, Ltd.

Bakery extension, Chesterfield Road; R. S. Worboys.

Murton (Co. Durham).—Welfare hall for the Miners' Welfare Committee; secretary.

Newcastle-on-Tyne.—Meals centre, Ravenswood; architect, Education Offices, Northumberland Road, Newcastle.

Northampton.—Reconstruction of offices, Wycliffe Road; W. J. Richardson & Son.

Northumberland.—Adaptation of Mitford Hall, Morpeth, as centre for youth activities; county architect, County Hall, Newcastle-on-Tyne.

Rotherham.—Nurseries, Ferham and St. Bede's schools (£1,330); Coe & Lorriman.

Southall.—Reconstruction, pumping station; borough engineer.

South Shields.—Blacksmiths' shop for Brigham & Cowan, shipbuilders; H. Hill, architect, Winchester Street.

Temporary workshop and office; J. W. Ridley, builder, St. Mary's Avenue.

Wartime nursery, Wellington Terrace; borough engineer.

Sunderland.—Temporary premises on the site of the Empress Hotel; W. & T. R. Milburn, 17, Fawcett Street.

Warehouse for Jos. Wilson & Co.; G. T. Brown & Son, Fawcett Street.

Extensions to the Grange Hotel, Ryhope Road; Messrs. T. A. Page, Son & Bradbury, King Street, South Shields.

Warrington.—Canteen, Oakwood school; borough engineer.

West Riding.—Erection of offices, site in Northgate, Wakefield; A. Booth, county architect, County Hall, Wakefield.

Wiltshire.—Central kitchen at Mere; T. Walker, county architect, County Offices, Trowbridge.

York.—Additions, Bishopthorpe Road; F. Hills & Sons, Ltd.